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INFECTION OF THE LOWER PART OF THE GENITAL TRACT IN GIRLS

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Infection of the lower part of the genital tract in girls presents many peculiar and exasperating problems. Although it is resistant to treatment and has a marked tendency to recurrence, it tends to disappear spontaneously at puberty. Its mode of spread is uncertain. The standard methods of diagnosis and the criteria of cure are unsatisfactory. Nevertheless, the lower part of the genital tract in girls receives less clinical attention than any other part of the body. Even in a girl with known pyuria, the presence of pus in the vagina is not uncommonly overlooked.

Nor is the importance of this type of infection as a social problem widely enough appreciated, particularly that of the sporadic form in the patient who is treated in the clinic and in the private patient. While so-called gonorrheal vulvovaginitis is generally recognized as an important institutional problem, it is commonly neglected in the outpatient, the neglect being disguised as "routine treatment," and when the usual laboratory methods fail to show the presence of the gonococcus, masterful inactivity is the usual guide-post of treatment. A too easy acceptance of the diagnosis that gonorrhea is absent has often masked the true nature of the infection and has led to the generally accepted opinion that gonorrhea in outpatient girls is an uncommon condition.

Statistics do not bear out this opinion. Nelson,[1] reporting the records of the Massachusetts department of public health, said that from 10 per cent to 12 per cent of the total cases of gonorrhea in

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1. Nelson, N. A.: New England J. Med. **207**:135, 1932.

females from 1919 to 1930 occurred in girls under 14 years of age. Speaking as a health officer, he expressed the opinion that not more than half of all girls with gonorrhea are seen by a physician and that of those seen not more than one-fourth are reported. Yesko [2] said that vulvovaginitis "outranks a large majority of the contagious diseases in children, running second to measles." Pollack's [3] estimate of from 800 to 1,000 cases annually in Baltimore and McElroy's [4] figure of 500 cases a year in Chicago are probably conservative, since the available statistics are for the most part those of reported cases in institutional children and include only cases of gonorrheal infection. Institutional contact, however, is not the most common source of the infection.[5] More than half of our series of children, consisting entirely of outpatients, contracted the infection in the home. This fact emphasizes the importance and the frequency of infection of the lower part of the genital tract in the outpatient of both the dispensary and the office.

A review of the literature shows that the opinions expressed from 1930 to 1935 are as varied and confused as those cited by Hamilton [5c] in 1908 and that little progress has been made in understanding the pathogenesis of infection of the lower part of the genital tract since the gonococcus was discovered by Neisser in 1879 and cultivated by V. Bumm in 1885. It is generally agreed that the epidemic form of vulvovaginitis as it occurs in institutions is due to the gonococcus. But the sporadic infections seen in outpatients are variously regarded as largely gonorrheal,[6] usually gonorrheal [7] or from commonly to almost entirely of a nonspecific catarrhal type.[8]

There is a marked diversity of opinion as to the site of the infection, its method of spread, the duration of its contagiousness, the rôles

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2. Yesko, S. A.: Gonorrheal Vulvovaginitis in the Young, Am. J. Dis. Child. **33**:630 (April) 1927.

3. Pollack, quoted by Yesko.[2]

4. McElroy, A. S.: Pennsylvania M. J. **34**:192 (Dec.) 1930.

5. (*a*) Tod, M.: Brit. J. Ven. Dis. **3**:113 (April) 1927. (*b*) Yesko.[2]

5c. Hamilton, A.: Gonorrheal Vulvovaginitis in Children, J. Infect. Dis. **5**: 133, 1908.

6. Spaulding, E. R.: Vulvovaginitis in Children, Am. J. Dis. Child. **5**:248 (March) 1913. Wessels, D. H.: South African M. Rec. **21**:310, 1923. Williams, P. F.: Am. J. Obst. & Gynec. **11**:487 (April) 1926. McElroy.[4]

7. (*a*) Lynch, F. J.: New England J. Med. **202**:1251, 1930. (*b*) Notes, B.: Arch. Pediat. **47**:58, 1930. (*c*) Rosenstern, J.: Therap. d. Gegenw. **68**:500 (Nov.) 1927. Tod.[5a]

8. (*a*) Stein, I. F.; Leventhal, M. L., and Sered, H.: Cervicovaginitis, Am. J. Dis. Child. **37**:1203 (June) 1929. (*b*) Rubin, F. C.: Boston M. & S. J. **178**: 147, 1918. (*c*) Ruys, A. C.: Zentralbl. f. Bakt. (Abt. 1) **127**:280, 1933. (*d*) Paul, K.: Arch. f. Kinderh. **97**:63, 1932.

played by the various organisms observed and the criteria of cure.[8e] The great number of the methods of treatment reviewed by Dorne and Stein [9] in 1924, since greatly increased, is in itself evidence of the fact that no satisfactory method has been found.

The majority of the studies that have been made have each been concerned with only one phase of the subject. Most of the intensive studies have been conducted in a hospital.[10] It was felt that a correlated study of the clinical, bacteriologic and sociological aspects of the condition in patients living in their usual environment might be of practical importance. Accordingly, the departments of pediatrics, bacteriology and social service of Northwestern University Medical School collaborated in the study of 121 cases [11] of infection of the lower part of the genital tract. No patient was observed for less than six months, and most were observed for five years. Since the questions raised involved both the gonorrheal and the nonspecific type of infection, all cases of infection of the lower part of the genital tract were included.

CLINICAL METHODS

In addition to the routine history taken at the dispensary, a special form was completed in order that we might obtain a more exhaustive history of the factors which might predispose the patient to genital infection. All patients received a complete examination, including a blood count and a urinalysis. This examination was repeated periodically during the study.

The initial local examination included a detailed inspection and recording of the condition not only of all parts of the lower portion of the genital tract but also of the perineum and the anus. Endoscopic examination of the vagina and the cervix was made in every case at frequent intervals. In the cases of acute involvement the initial endoscopic examination was postponed until the inflammation was less severe. A total of 842 endoscopic examinations were made during the study, and over 2,000 smears were studied.

Material for bacteriologic study was taken from the urethral orifice, the vaginal opening and the rectum by means of cotton applicators and from the vaginal walls and the cervix through the endoscope.

8e. The disagreement on these basic facts is emphasized in a recent review of the literature by R. A. Benson and A. Steer (Vaginitis of Children: A Review of the Literature, Am. J. Dis. Child. **53**:806 [March] 1937).

9. Dorne, M., and Stein, I. F.: Illinois M. J. **45**:219 (March) 1924.

10. An outstanding exception is the work of Brunet and his co-workers (Brunet, W. M.; Tolle, D. M.; Scudder, S. A., and Medcalf, A. R.: Cervico-Vaginitis of Gonococcal Origin in Children, Hosp. Social Service Mag., supp. 1, March 1933).

11. The apparent discrepancy between the results in the various groups and the end-results shown in table 9 is due to the fact that a distinction was made between patients and cases. When a child showed no improvement or else unsatisfactory progress after six weeks of treatment the record was closed, and after the patient had had one month's rest the treatment was changed and the case was reopened as a new case. This occurred in 34 cases of gonorrhea in which the patient received local treatment.

The technic of obtaining vaginal and cervical secretion was as follows: After material was obtained from the external genitalia, the vulva was washed with soap and water and dried with sterile gauze. A sterile no. 30 Kelly endoscope was inserted just into the vagina. An endoscope of this size fits the introitus tightly enough to seal the opening of the vagina. The obturator was then removed and an air-tight window and side arm were fitted onto the endoscope. The vagina was then inflated under inspection to the point at which the vaginal walls were separated sufficiently to allow the endoscope to be passed in just short of the cervix without touching the vaginal mucosa. The window was then removed, and a fitted sterile tube was passed through the endoscope to the cervical os. Through this inner tube was passed a small glass pipet, with its point carefully rounded, which was connected with a rubber bulb for suction. Even when there was only a little secretion at the cervix, a few drops could usually be obtained by this method. If the amount of material was insufficient, from 0.5 to 1 cc. of sterile warm distilled water, adjusted to a p_H of 7, was first introduced through the pipet.

It was felt that this method of introducing the apparatus under constant visual control minimized, as far as possible, the chances of contaminating the cervix with organisms from the superficial portions of the vagina. After material was obtained, the tube was removed, the cervix and the vagina were inspected and any topical applications were made.

The use of this technic was continued for several months, but when no distinctive differences were found between the flora of the cervical and that of the distal portion of the vagina, the use of the inner tube was discontinued and the endoscope was passed directly to the cervix.

The mother was given printed instructions as to the home care of the child. These instructions were explained to her in detail. Every effort was made to obtain her cooperation, and owing to the intelligent handling by the nurse in charge we had willing allies in most of the mothers.

No treatment was instituted until the initial bacteriologic study was completed. During the course of treatment, the examination described was repeated at intervals of one week. Treatments were so arranged that no medication was given for two days preceding each examination.

BACTERIOLOGIC METHODS

The watery or puslike secretion collected from the cervix was cultured directly in the early part of the study. Later, the material was first transferred to a small test tube containing a few drops of sterile distilled water. After thorough mixing, the contents were employed to inoculate the aerobic mediums, a glass rod being used to streak the plates. If the quantity of inoculum permitted, anaerobic cultures were also made. In the earlier cases aerobic cultures were made on brain agar plates, on plates of brain agar plus 5 per cent of blood, on blood agar plates and on plates of Hall's testicular infusion-blood agar. Later, brain agar, brain-blood agar and ascitic phosphate agar were used. The testicular infusion-blood agar medium produced larger colonies of gonococci and a luxuriant growth, if growth occurred at all, but it was capricious and isolation was not dependable. The same result was obtained with plain blood agar except that the growth was not quite so luxuriant and subcultures often failed to grow at all. Still later, the use of brain agar plates was discontinued, and ascitic phosphate agar and blood agar plates were employed. Finally, ascitic agar (20 cc. of ascitic fluid to 100 cc. of infusion agar, p_H 7.6) plates alone, in duplicate, were used. It was observed that this medium was fully as reliable for the isolation of the gonococcus as the more complicated mediums. Streptococcus colonies, which appear quite different from

gonococcus colonies on ascitic agar, were subcultured on blood agar plates to determine whether hemolysis was present.

For the anaerobic cultures, a blood agar plate was streaked and was incubated in a Varney jar for from seven to nine days. Two tubes of previously heated and cooled beef heart broth, one with a constriction in which reposed a marble, were also inoculated. Both tubes were sealed with sterile liquid petrolatum. These tubes were incubated seven days, and then examined, and blood plates were streaked. The blood plates were then incubated for from seven to nine days in the Varney jar. Later, the use of the blood agar plate for primary isolation was omitted, and only the beef heart tubes were employed. These were incubated for from nine to fourteen days; then blood agar plates were inoculated in duplicate, one plate being incubated in the Varney jar and the other aerobically for from nine to fourteen days. Later, the ball tube was omitted and petrolatum was used instead of oil to seal the culture.

The mixture of pus and water remaining in the tube after the cultures had been made was examined for Trichomonas, yeast cells and parasitic ova. If enough discharge was obtained, a determination of the p_H was made with the LaMotte colorimetric test, with which a close approximation to the actual p_H can be made easily with one drop of the material to be tested.

Identification of the Gonococcus.—Dry smears were stained by a modification of the Gram method and classified in the following standard manner:

Positive: more than ten typical gram-negative diplococci seen intracellularly on the slide and two or more within the cytoplasm of the same cell.

Suspicious: gram-negative diplococci of typical morphology seen only extracellularly or when less than ten scattered diplococci were seen intracellularly, not more than one within the cytoplasm of the same cell.

Negative: no gram-negative diplococci of typical morphology seen either intracellularly or extracellularly. Regardless of the number of pus cells, a smear was reported as negative for the gonococcus when no organism resembling the gonococcus was seen, although the number of epithelial cells and the approximate number of polymorphonuclear leukocytes were noted.

The colony type, the morphology and the results of agglutination tests with antigonococcus serum and of sugar fermentation tests were used in the identification of the gonococcus observed in cultures. In the later cultures the oxidase reaction with tetramethylparaphenylenediamine hydrochloride was also tried. This test was found to be of value, especially when there were only a few gonococcus colonies on a plate. It was not, however, specific for the gonococcus. Aerobic cultures were examined after twenty-four, forty-eight, ninety-six and one hundred and twenty hours' incubation, and colonies were picked for identification. The aerobic cultures were incubated in a moist atmosphere. Typical colonies were picked onto brain agar slants and kept on this medium while the strains were being studied. In the early part of the study, fermentation was determined in a 1 per cent carbohydrate broth containing 1 per cent of sheep serum. Dextrose, maltose and a control tube containing serum but no added carbohydrate were used. The sugar consumption was determined by recording the p_H change daily for fourteen days. Subcultures of all tubes after from fourteen to twenty days proved that the gonococci were still in pure culture. Later, a semisolid nitrate agar containing 1 per cent of carbohydrate and Andrade's indicator was substituted for the serum broth. It was observed that all the strains of gonococci tested showed the presence of acid in both dextrose and maltose in the serum carbohydrate broth. A few strains tested in both serum broth and nitrate agar without serum disclosed the fact that maltose was not fermented in the semisolid nitrate medium, while it

apparently was fermented when serum broth was used. The control tube with serum alone showed no fermentation. Eighteen strains were also tested in lactose, saccharose, galactose, salicin, inulin, dextrin and mannitol. None of these sugars was fermented.

Antiserum was prepared by intravenous or subcutaneous injection of heat-killed gonococci into rabbits twice weekly until a high titer was obtained. As an antigen, the Torrey strain no. 34 was employed. This strain has been found by Torrey and others to be the most common of the group. Its use in making an antiserum is justified by their experience, which shows that it has enough in common with all the other strains to serve as a satisfactory antigen.

Identification of Other Organisms.—Bile solubility tests were made for streptococci and pneumococci. Streptococci were differentiated by the reaction on blood agar and by sugar fermentation tests. The Holman classification, based on the fermentation of lactose, mannitol and salicin, was followed. Final readings on the sugar mediums were not made for any organism with less than seven days' incubation. Hemophilic bacilli were identified as small gram-negative bacilli which grew on a blood medium only. In two cases symbiotic growth with staphylococci was observed. No attempt was made to classify these bacilli.

SOCIOLOGICAL METHODS

A social worker visited the home of each patient at intervals. In addition to obtaining the information needed, she reviewed the home care of the child and made the necessary arrangements for the examination for venereal disease of other members of the family. As a result, definite information as to genital infection in the home was obtained in all but 13 cases. This was of value in determining and controlling the source of the infection and in differentiating between reinfections and exacerbations.

CLINICAL FINDINGS

Age Incidence and Seasonal Variation.—The series included 89 children, of whom 53 were white and 36 colored. In 76.6 per cent the infection was gonorrheal and in 23.4 per cent nonspecific.[12] A comparison of our figures for age distribution with those of the Massachusetts department of public health from 1919 to 1931, as reported by Nelson,[1] is as follows:

Age of Child	Our Series (All Cases), Percentage	Nelson's Cases of Gonorrhea, Percentage
Under 5 years	35.3	31.4
From 5 to 9 years	49.5	44.9
From 10 to 14 years	15.2	23.7

The onset of the infection occurred in the spring or the summer in 55.2 per cent of the cases and in the fall or the winter in 44.8 per cent, with the peak in May. These figures do not confirm those of Blum,[13] who found the highest incidence in the winter and the spring, with a

12. The infection was due to the gonococcus in 72.9 per cent of the white children and in 80.6 per cent of the Negro children.

13. Blum, J.: Arch. Pediat. **45**:357 (June) 1928.

marked drop in the summer. They conform more closely with the figures given by Yesko,[2] which are based on the United States public health records of all gonorrhea in females from 1919 to 1925. The age incidence and the seasonal variation in our series were roughly parallel for the cases of gonorrhea and those of nonspecific infection.

Symptoms.—The only constant complaint described in the histories was the presence of a discharge. At the onset this was profuse, constant, greenish yellow and purulent. After from one to three weeks it gradually subsided to a scanty or intermittent yellow-gray watery or mucoid discharge. Often when there was no gross secretion at the vulva, dried yellowish spots on the child's underwear demonstrated the intermittent character of the discharge. Burning and pain at urination and itching were frequent complaints. Pain over the pubis was a rare symptom. Lassitude, anorexia and slight fever were occasional complaints. After from four to six weeks the course was entirely symptom-

TABLE 1.—*Sites of Infection in Cases of Gonorrhea*

	Vulva	Cervix	Vagina	Urethra	Para-Urethral Ducts
Throughout course	49	46	3	18	1
Intermittently	6	3	6	2	..
In acute stage only	6	10	16	9	..
At one examination only	..	..	..	1	1
Total (cases)	61	59	25	30	2
(Percentage)	100	98.4	40.9	49	3.2

less except during exacerbations, when subjective symptoms, rarely as intense as at the onset, recurred. Occasionally a child was seen who had no symptoms from the onset.

Physical Findings (Tables 1 and 2).—In the acute stage the introitus was constantly involved. It was red, edematous and at times eroded. The labia minora and the labia majora were constantly reddened, often edematous or excoriated and sometimes dotted with follicular infections, which occasionally extended over the perineum and the inner aspects of the thighs. The acute inflammatory changes decreased with the subsidence of the discharge but tended to recur, with or without the recurrence of pus. In the chronic stage, the cutaneous areas often showed eczematoid changes of a dry and scaly or intertriginous type, while the introitus was usually lax, bluish red and occasionally scarred.

The urethral orifice was involved in about one half of the cases of gonorrhea and in about one fourth of the cases of nonspecific infection. It was prominent, reddened and sometimes everted. Evidence of urethral inflammation tended to disappear and to recur during the course of the disease without any relation to fluctuations in the amount of discharge. There was no correlation between urethral findings and

dysuria. Occasionally, at the termination of the disease the urethral orifice was scarred and distorted.

Widely divergent opinions as to the incidence of urethral involvement are found in the literature. Brunet and his co-workers [10] said that it does not occur often; Kidd [14] and Simpson placed its incidence at 10 per cent; Williams' figure [15] is 20 per cent; Noeggerath and Nitschke,[16] Stein [17] and many others expressed the opinion that urethritis is an "inevitable implication." Abraham,[18] agreeing with this opinion, said that unrecognized urethritis is a common cause of relapses. Ivanov,[19] on the other hand, said that urethritis plays no part in determining the course of the disease and that urethral involvement is due only to secondarily invading organisms.

The urethral and vestibular glands were involved in only 4 cases—2 of specific and 2 of nonspecific infection. In 2 instances (1 of specific and 1 of nonspecific infection) there was evidence of inflammation at only one examination. In no case did the changes progress beyond

TABLE 2.—*Sites of Infection in Cases of Nongonorrheal Infection*

	Vulva	Cervix	Vagina	Urethra	Para-Urethral Ducts
Throughout course	12	9	..	4	1
Intermittently	6	7	2	..	..
In acute stage only	3	4	2	1	..
At one examination only	..	..	..	..	1
Total (cases)	21	20	4	5	2
(Percentage)	100	95.2	19	24	9.5

the stage of redness and swelling. In all but 1 case (of nonspecific infection) the involvement was bilateral, a condition which has been noted by Welde.[20]

Infection of Bartholin's and Skene's glands is generally considered a rare and unimportant part of the picture. Although Valentin [21] reported involvement of Skene's ducts and Meyerstein [22] expressed the

14. Kidd, Frank: Common Infections of the Female Urethra and Cervix, London, Oxford University Press, 1924.

15. Williams, T. J.: Am. J. Obst. & Gynec. **16**:861 (Dec.) 1928.

16. Noeggerath and Nitschke, in von Pfaundler, M., and Schlossmann, A.: The Diseases of Children, translated by M. G. Peterman, Philadelphia, J. B. Lippincott Company, 1935, vol. 5, p. 138.

17. Stein, I. S., in Abt, I. A.: Pediatrics, Philadelphia, W. B. Saunders Company, 1926, vol. 6, p. 685.

18. Abraham, J. J.: Lectures on Gonorrhea in Women and Children, Chicago, Chicago Medical Book Company, 1924, p. 10.

19. Ivanov, N. S.: Arch. f. Gynäk. **155**:605, 1934.

20. Welde, E.: Ergebn. d. inn. Med. u. Kinderh. **18**:263, 1920.

21. Valentin, I.: Deutsche med. Wchnschr. **47**:628, 1921.

22. Meyerstein, quoted by Ivanov.[19]

belief that Bartholin's glands are a focus in chronic infection, their observations have not been generally confirmed. As Schauffler and Kuhn [23] and others have pointed out, these glands do not develop until puberty and do not offer a harbor of infection in childhood. When they are involved, the infection is necessarily limited to the superficial portions of the ducts and offers no difficulty in treatment.

The vaginal wall was not frequently involved. In only 3 of the 89 cases was there visual evidence of true vaginitis throughout the course of the disease. In 16 cases, redness and swelling were present only for the first two or three weeks. In 6 cases, mild inflammatory changes occurred intermittently. In 2 of the cases of nonspecific infection, pea-size granulomas were seen on the wall of the vagina. These disappeared after three weekly applications of 10 per cent silver nitrate solution. We did not see a pseudomembrane or any erosion, distortion or scarring of the vagina in any patient.

The cervix was involved in 98 per cent of the cases of gonorrhea and in 95 per cent of the cases of nonspecific infection. In the acute stage it was red, edematous and often eroded, granular or covered with a pseudomembrane. Occasionally, submucous hemorrhages were seen. In the subacute and chronic stages, it usually remained large and pedunculated, with deep irregular crypts in its surface, which resembled the distorted cervical os. It was usually friable, especially in the subacute stage. Occasionally, atrophic changes were seen in the chronic stage, but these occurred more commonly after the disease had become latent. In our series, it was unusual to see a normal cervix in a patient in whom the condition had become latent until the changes of puberty occurred. At that time, the cervix resumed its normal size and appearance.

The majority of writers have stated or inferred that the vagina is the seat of infection of the lower part of the genital tract in girls. Bernstine,[24] for example, mentioned the oft quoted hypotheses that the delicate stratified squamous epithelium of the immature vagina is not resistant to infection, as is the cornified lining of the adult, and that because of the closed cervical os, infection does not extend upward. Perrin,[25] however, stated in 1911 that the essential infection in gonorrhea was almost always endometritis of the neck of the cervix. Koplik [26] as early as 1893 called attention to the frequency with which pus was found exuding from the cervical os. Rubin and Leopold [27]

23. Schauffler, G. C., and Kuhn, C.: Am. J. Obst. & Gynec. **25**:374 (March) 1933.

24. Bernstine, J. B.: M. J. & Rec. **135**:290 (March 16) 1932.

25. Perrin: Rev. méd. de la Suisse Rom. **31**:732, 1911.

26. Koplik, quoted by Barnett, N.: Am. J. Obst. & Gynec. **68**:600, 1913.

27. Rubin, I. C., and Leopold, J. S.: On the Cause of the Persistence of Gonorrheal Vulvovaginitis in Children, Am. J. Dis. Child. **5**:58 (Jan.) 1913.

in 1913 called attention to cervical involvement as a reason for the persistence of the infection. Hess [28] in 1916 studied 4 patients at autopsy and observed that the vaginal mucosa was comparatively free from infection, especially after the acute stage had passed, but that inflammation of the cervix about the external os was constantly present. Since then Norris and Mickelberg,[29] Blum,[13] Stein [8a] and others have stressed the importance of the cervix as the essential site of infection. Schauffler and Kuhn [23] expressed the belief that the organism is harbored in the crypts and rugae of the vagina and of the vaginal cervix. Brunet [10] said that while inflammation of the vagina is present in many cases it is usually mild and subsides rapidly as the infection gains a foothold in the cervix. This fact he, as well as von Pourtales [30] and others, attributed to the paucity of glands in the vaginal mucosa and their prevalence in the cervix. Ivanov,[19] who made microscopic studies of excised tissue, expressed the belief that the infection spreads from the vulva to the cervix through the deep, middle layer of the vaginal wall, which is like connective tissue, and that the lining epithelium is not involved. Huberman and Israeloff,[31] on the other hand, observed round cell infiltration in the epithelial lining of the vagina in sections studied at biopsy. They did not describe the microscopic appearance of the cervix.

These observations have confused the nomenclature of the disease. Stein suggested the term "vulvocervicitis." Helmholz and Amberg [32] said that "vulvourethritis" is more often correct. Notes [7b] expressed a preference for the name "urethro-vulvo-cervicitis." We have used the general term infection of the lower part of the genital tract, as suggesting a parallel to a condition equally variable in its manifestations—infection of the upper part of the respiratory tract.

More important than terminology, however, are the facts that vaginitis is not the essential factor in the disease and that cervical involvement must be considered in any rationale of treatment.

Complications.—We were surprised to find that in spite of routine cultures and smears of material from the rectum and frequent proctoscopic examinations, we found no instances of rectal or anal disease in

28. Hess, A.: Provocative and Prophylactic Vaccination in the Vaginitis of Infants, Am. J. Dis. Child. **12**:466 (Nov.) 1916.

29. Norris, C. C., and Mickelberg, H. B.: Diagnosis of Gonorrhea in the Female by Staining Methods, J. A. M. A. **76**:164 (Jan. 15) 1921.

30. von Pourtales: Arch. Pediat. **49**:121 (Feb.) 1932.

31. Huberman, J., and Israeloff, H. H.: Therapeutic Value and Effects of Amniotin in Gonorrheal Vaginitis in Children, J. A. M. A. **103**:18 (July 7) 1934.

32. Helmholz, H. F., and Amberg, S.: Clinical Pediatrics in Diseases of the Genito-Urinary System in Infancy and Childhood, New York, D. Appleton and Company, 1930, vol. 19, p. 225.

the cases of gonorrhea. The literature concerning proctitis associated with infection of the genital tract refers entirely to infection of the gonorrheal type. There is increasing evidence of the frequency of this complication. Fraser [33] and Ruys and Jens [34] found gonococci in the rectum in 100 per cent of their series. Blum,[13] Hayes,[35] Rosenstern,[7c] Black [36] and many others expressed the opinion that it is a frequent complication and an important factor in exacerbations of the genital infection. Byfield and Floyd [37] reported a hospital epidemic of gonorrheal infection of the genital tract which was traced to boys in a ward who had unrecognized rectal gonorrhea. Bloomberg and Barenberg [38] cited gonorrheal proctitis as a cause of hospital epidemics of dysentery. On the other hand, Brunet [10] and Notes,[7b] among others, found no instance of this complication in their series. It must be remembered, as Ivanov [19] pointed out, that the presence of gonococci in the rectum does not prove the existence of a rectal disease. Although the evidence on hand is suggestive, the rôle of proctitis in genital gonorrhea cannot be definitely determined until more exact methods of diagnosis are developed.

Mild bilateral inguinal adenitis occurred occasionally. It never approached the stage of suppuration. Occasionally, enuresis was coincident with the infection.

Salpingitis occurred in 2 patients, in a Negro child of 13 years at the onset of the infection and in a 7 year old white girl who had received no treatment. Both girls recovered uneventfully. No other instance of involvement of the upper part of the genital tract was encountered. Salpingitis and peritonitis, while rare, are definite possibilities with both the specific and the nonspecific type of infection. Cases have been reported by Baer,[39] Black [36] and many others.

Schwartz [40] reported 2 cases of gonorrheal cystitis. Taussig [41] and others have observed gonorrheal ophthalmia.

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33. Fraser, A. R.: J. Urol. **5**:439, 1921.

34. Ruys, A. C., and Jens, P. A.: München. med. Wchnschr. **80**:846 (June 2) 1933.

35. Hayes, H. H.: Gonorrhea of Anus and Rectum, J. A. M. A. **93**:1878, (Dec. 14) 1929.

36. Black, C. V.: J. Kansas M. Soc. **36**:156, 1935.

37. Byfield, A. H., and Floyd, M. L.: Arch. Pediat. **41**:673, 1924.

38. Bloomberg, M. W., and Barenberg, L. H.: Gonorrheal Proctitis as a Cause of Blood and Mucus in the Stools of Infants, Am. J. Dis. Child. **29**:207 (Feb.) 1925.

39. Baer, J. L.: J. Infect. Dis. **1**:313, 1904.

40. Schwartz, A. B.: The Bacteriology of the Urine in Children with Vulvovaginitis, Am. J. Dis. Child. **13**:420 (May) 1917.

41. Taussig, F. J.: Am. J. Obst. & Gynec. **148**:480 (Oct.) 1914.

Arthritis has been reported occasionally. Abt [42] described a case in which arthritis was associated with endocarditis and in which the outcome was fatal. He said that the arthritis usually affects the smaller joints. Noeggerath and Nitschke [16] discussed gonorrheal sepsis.

We saw none of these complications in our series.

Distinction Between Gonorrheal and Nonspecific Types of Infection.—In the large majority of cases of nonspecific infection the condition was a secondary catarrhal infection, secondary usually to infection of the upper part of the respiratory tract and occasionally to an acute exanthem, to infection of the bowel or to cutaneous infection. In a few cases, in which poor hygiene and malnutrition played a part, the infection was of the primary type. In still fewer it was of the irritative type, being due to tight underwear, foreign bodies or parasite infestation of the vagina.

There were no qualitative distinctions in the history and findings between the cases of specific and those of nonspecific infection except those which have been noted. An acute phase in a case of gonorrhea was often precipitated by the same causes that initiated a nonspecific infection. Malnutrition and poor hygiene were factors in both cases of chronic gonorrhea and cases of primary nonspecific infection.

The gonorrheal infection was in general more stormy in its onset, and the symptoms were usually more intense. But there were enough exceptions to make a distinction on the basis of symptoms and clinical findings purely conjectural. In fact, the most intense symptoms and findings occurred in one case of nonspecific infection in which smears and cultures showed a predominance of Streptococcus haemolyticus. Nor was there any distinctive difference in the blood counts in the two types of condition. The highest white cell count (23,325) was observed at the onset in a case of acute specific infection in which there was no demonstrable pathologic change outside of the lower part of the genital tract. The lowest count (5,000) also was observed in a case of acute specific infection. The average white cell count at the onset in the cases of gonorrheal infection (40 cases) was 9,570; in the cases of nonspecific infection (12 cases), 9,320. The differential counts were not distinctive.

The final diagnosis as to type was necessarily based entirely on the examination of smears and cultures.

BACTERIOLOGIC OBSERVATIONS

The observations on 206 cultures in 61 cases of gonorrhea and on 58 cultures in 29 cases of nongonorrheal infection are given in tables 3 and 4, respectively. A survey of these tables reveals the fact that

42. Abt, I. A.: Urol. & Cutan. Rev. **20**:201 (Jan.) 1916.

diphtheroid organisms were observed in the greatest numbers and in approximately the same percentage in both the cases of gonorrhea and the cases of nongonorrheal infection. Next in frequency in the cases of gonorrhea was the gonococcus, followed by Staphylococcus albus, the latter being observed in a high percentage of both groups. Streptococci were isolated next most frequently and in apparently greater variety in the cases of gonorrhea. In both groups the indifferent, or gamma, type predominated, while hemolytic streptococci of all types were observed in greater numbers in the cases of gonorrhea. Bacillus coli was frequently encountered, especially in the cases of gonorrhea.

TABLE 3.—*Organisms Observed in Cases of Gonorrhea (61 Cases, 206 Cultures)*

Organism	Times Found	Percentage of Cultures	Number of Cases	Percentage of Cases
Diphtheroids	143	69.4	45	73.7
Gonococcus	95	46.1	33	54.0
Staph. albus	89	43.2	39	63.9
Str. indifferens	60	29.1	23	37.7
B. coli	45	21.8	20	32.8
Str. salivarius	20	9.7	16	26.2
Str. viridans	16	7.7	10	16.3
Str. faecalis	14	6.8	10	16.4
Gram-positive cocci (unclassified)	14	6.8	8	13.1
Staph. aureus	12	5.8	9	14.7
Sarcina lutea	10	4.8	9	14.7
Str. ignavus	9	4.3	5	8.1
B. proteus	7	3.4	5	8.2
Str. haemolyticus	6	2.9	6	9.8
Str. pyogenes	4	1.9	4	6.6
Str. anginosus	4	1.9	4	6.6
Gram-negative cocci (unclassified)	3	1.4	3	4.9
Str. infrequens	2	1.0	2	3.3
Str. haemolyticus iii	2	1.0		
Micrococcus catarrhalis	2	1.0	2	3.3
B. Döderleini	2	1.0	1	1.6
Hemophilie bacilli	2	2.0*	1	3.2†
Streptothrix-like organisms	2	1.0	2	3.3
Str. equi	1	0.5	1	1.6
B. dysenteriae Flexner	1	0.5	1	1.6

* Based on 98 cultures.
† Based on 31 cases.

An atypical strain (no gas in the sugars tested—dextrose, lactose, saccharose and mannitol) was isolated in 1 case of gonorrhea five times during the two months of treatment. Atypical forms of B. coli were observed in 4 cases altogether. The atypical forms were seen as R type colonies on the ascitic agar plates. Gelatin was not liquefied. Milk was acidified, but only one strain caused coagulation. All the strains were nonmotile in broth cultures. The organism isolated five times in the 1 case was invariably a slow lactose fermenter, from five to ten days' incubation being required before an acid reaction was observed, although growth occurred in twenty-four hours. Saccharose fermentation by these five strains was variable. Two out of the five fermented saccharose in twenty-four hours, one in seven days, another in nine days and one in thirteen days. The other three atypical strains of

B. coli did not ferment saccharose. Dextrose and mannitol were in all cases fermented within twenty-four hours. In 1 case a typical strain of B. coli was isolated, as well as an atypical strain. Typical strains were isolated in another case both before and after the atypical strain appeared. The typical strains grew in slightly granular colonies. Hemophilic bacilli and streptothrix-like organisms appeared in a higher percentage of the cases of nongonorrheal infection. Gram-negative diplococci other than gonococci were observed in 3 cases of gonorrhea. These were not classified, but cultural and serologic reactions clearly showed that they were not gonococci.

No true anaerobes were found in 176 cultures made in 74 cases. Anaerobic streptococci have been reported present in the vagina.[43]

Bacillus dysenteriae Flexner was observed in 1 case of gonorrhea and in 2 cases of nongonorrheal infection. In the first case the gono-

TABLE 4.—*Organisms Observed in Cases of Nongonorrheal Infection (29 Cases, 58 Cultures)*

Organism	Times Found	Percentage of Cultures	Number of Cases	Percentage of Cases
Diphtheroids	40	68.9	24	82.7
Staph. albus	33	56.9	21	72.4
Str. indifferens	14	24.1	7	24.1
Str. ignavus	10	17.2	6	20.6
Str. salivarius	9	15.5	6	20.6
Str. haemolyticus	8	13.7	3	10.3
B. coli	7	12.0	4	13.7
Hemophilic bacilli	6	10.3	6	20.6
B. dysenteriae Flexner	5	8.6	2	6.8
Str. faecalis	4	6.8	1	3.0
Streptotrix-like organisms	4	6.8	4	13.7
Staph. aureus	3	5.1	1	3.4
Sarcina lutea	2	3.4	2	6.8
Micrococcus catarrhalis	2	3.4	1	3.4
Pneumococcus	2	3.4	1	3.4
Str. citreus	1	1.7	1	3.4
B. Döderleini	1	1.7	1	3.4

coccus was the predominating organism, with the Flexner bacillus ranking next. Diphtheroids were also present. The dysentery bacillus appeared in the primary plates as R type colonies. It agglutinated with Flexner serum in dilutions of from 1:640 to above 1:2,560, with a prezone in the lower dilutions. In 1 case of nongonorrheal infection, the Flexner bacillus also appeared as an R type colony on the primary plate. Its agglutination reactions were similar to those of the organism isolated in the case of gonorrhea. It did not agglutinate with antishiga serum but did agglutinate with antityphoid serum up to a dilution of 1:80. Nonhemolytic streptococci were observed at all examinations. Staphylococcus aureus and Staph. albus were present before treatment. The blood serum of the patient agglutinated the Flexner bacillus in a dilution of 1:320. In the other case of nonspecific infection, the Flexner

43. Soule, S. D., and Brown, T. K.: Am. J. Obst. & Gynec. **23**:532, 1932.

bacillus was found twice, the second time after a six month interval. Its characteristics were similar to those of the bacillus in the other 2 cases. In none of the cases were dysentery bacilli found in the stools, which were cultured frequently. Examination of all the other members of the families gave negative results bacteriologically and serologically, and no member of the families had a history of diarrhea. The infections were all unusually resistant to treatment.

Although dysenteric vulvovaginitis secondary to intestinal dysentery has been reported by Teveli [44] and others, we have found but one report of apparently primary genital invasion by bacilli of the dysentery group. Chaskina-Munder [45] reported 2 cases of nongonorrheal infection which seem in all respects comparable to the 2 cases of nonspecific infection in our series. We have not found a report of the isolation of dysentery bacilli in a case of gonococcic infection of the genital tract.

We hoped to be able to observe the effect of each particular type of treatment on the bacterial flora. However, since the flora was so varied, not only in the different cases but also in the same case at different times, no satisfactory conclusions could be drawn. This was especially noticeable in the cases in which treatment with estrogen was employed, in many of which cultures were made at weekly intervals for a long period. Further, the number of cases in each treatment group in which regular bacteriologic examinations were made was too small for the observations to be of any value.

On the whole, the frequency of the various types of organisms, with the exception of the gonococcus, seems to be approximately the same for the cases of gonorrheal as for the cases of nongonorrheal infection. No one organism can be assigned as the etiologic agent in the cases of nonspecific infection here presented.

The percentage of gonococci found in the cases of gonorrhea seems rather low. The gonococcus was found by smear or by culture or by both in only 32 of the 58 cases at the time the first culture was made. The patients were not all in the acute stage when the first culture was made. Table 5 shows the comparison between the smears and the cultures in 61 cases of gonorrhea.

In about 10 per cent of the cases in which the smears were negative, the cultures were positive. The rather high percentage of cases in which smears were positive and cultures negative may be due to several factors. In the first place, gonococci vary in viability when first isolated. At least it was our experience that some strains were hard to grow after isolation, although vigorously growing strains were isolated at the same time on the same medium. In the second place, the gonococci seen in the smear may have been nonviable organisms. The figures

44. Teveli, Z.: Arch. f. Kinderh. **104**:69, 1935.
45. Chaskina-Munder, G.: Ztschr. f. Kinderh. **48**:690, 1930.

emphasized the need for examination of the discharge by both smear and culture for a reliable diagnosis.

Trichomonas vaginalis was found in two girls, 10 and 12 years of age, respectively. Determinations of the hydrogen ion concentration were made nine times in 1 case and once in the other. The range was from less than 4.8 to 6.4 and the average 5.7. One of these patients had been under observation in the dispensary since three months after the first appearance of the discharge, and though repeated smears had been taken, a definite report of the isolation of gonococci had never been given. The stained smears had in them masses of pleomorphic gram-positive organisms (either very small bacilli or elongated diplococci). The culture showed, in addition to Streptococcus faecalis and diphtheroids, large numbers of pleomorphic streptococci growing capriciously; they were slightly green-producing and never fermented any of the three sugars. The direct smears of the discharge in the other case in which T. vaginalis was seen presented the same picture. A pleomorphic organism, probably a streptococcus, was obtained in the

TABLE 5.—*Comparison of Smears and Cultures*

Smears	Cultures, Positive	Percentage	Negative	Percentage
88 positive	70	79.5	18	20.5
105 negative	10	9.5	95	90.5
21 suspicious	15	72.0	6	28.0

original culture but failed to grow in transplants. The child did not return to the clinic and was not observed further. Hibbert [46] and Hesseltine [47] described a nonhemolytic streptococcus in cases of trichomonas vaginitis. They, as well as others, expressed the belief that it is the important organism in this type of infection and that the trichomonas is only a saprophytic scavenger.

The hydrogen ion concentration was determined colorimetrically a total of 113 times in 45 cases of gonorrhea and 23 times in 16 cases of nongonorrheal infection. An average of 7 was found in the cases of specific infection and of 6.9 in those of nongonorrheal infection. In 1 case, that of a 12 year old girl, the p_H was determined 7 times and the average was 5.4. One patient, 11 years old in whom the condition was latent showed a p_H of less than 4.8.

SOCIOLOGICAL FINDINGS

An exhaustive study of the social background was made in 71 cases of gonorrhea and in 24 cases of nonspecific infection. Table 6 shows

46. Hibbert, G. F.: Am. J. Obst. & Gynec. **25**:465, 1933.
47. Hesseltine, H. C.: Am. J. Obst. & Gynec. **26**:46, 1933.

that in over half of the cases of gonorrhea the infection was probably contracted in the home; in about 20 per cent, in institutions or public places (e. g., from toilet seats), and in about 6 per cent, through sexual contact. Wehrbein,[48] in a study of the statistics of the health department of New York City, found that adults in the family had gonorrhea in only 15 per cent of the cases. She stated, however, that it was impossible to get complete statistics. Tod,[5a] on the other hand, reported 51 cases of juvenile gonorrhea in which the source of infection had been traced. Thirty-three of the mothers and 2 of the fathers had positive smears. In other words, there was a source of contact in the home in 68 per cent of the cases. Yesko's [2] chart, illustrating the mode of transmission and compiled from extensive statistics, indicates that

TABLE 6.—*Sources of Infection in Cases of Gonorrhea*

	Number of Cases	Percentage	History of Definite Exposure†	History of Probable Exposure
Home	38*	53.5	27	11
Institution	6	8.5	4	2
Public place	8	11.3	7	1
Sexual contact	4	5.7	3	1

* See table 7 for relative percentages of exposure to adults and to children.
† In 10 cases there was no history of exposure, and in 5 other cases there were insufficient data.

TABLE 7.—*Relative Importance of Children and of Adults as the Source of Infection in Cases in Which the Condition Was Contracted in the Home*

Source of Infection	Adult	Probably Adult	Child	Probably Child	Child and/or Adult
Cases	20	9	1	0	8

the home was the probable source of infection in about 40 per cent of the cases. Tod and Wehrbein reported sexual contact in 6 per cent and 5 per cent, respectively, of their series.

The investigation of the homes of the children in our series revealed an unexpected fact: In only 1 case was another child the only known source of infection (table 7). In 8 other families there were other children with gonorrhea, but in these 8 families there were also adults with active infections.

Table 8 contains data only on cases in which there were other immature girls in the family. Twenty-five children with gonorrhea exposed 38 sisters, in 7 of whom the disease subsequently developed. Of these, 6 were also exposed to gonorrhea by adults in the family. One might suppose that the more cases in the family, the greater is the

48. Wehrbein, K.: Arch. Pediat. **44**:243 (April) 1927.

possibility of spread. This was not borne out, however, since the families of the 12 patients who had more than 1 sister showed a lower incidence of cases of the secondary development of the infection than did the families of the 13 patients who had only 1 sister. The single definite case of spread between children occurred in the latter group.

The infrequency with which gonorrhea is spread from 1 child to another has been noted before, especially by Yesko [2] and by Witherspoon and Butler.[49] (The last-mentioned authors stated that they had seen no instance of a child's becoming infected from a sister.) It is difficult to correlate this questionable contagiousness of juvenile gonorrhea with the epidemic character which the disease assumes in institutions.

There was a history of exposure to gonorrhea in 5 of the 24 cases of nonspecific infection. These figures are of significance only because they raise a question of the diagnosis. The smears and cultures in these cases were consistently negative for gonococci, and the duration

TABLE 8.—*Gonorrheal Infection in the Immature Sisters of 25 Patients with Gonorrhea*

	Sisters Under 13 Years Old	Positive Smears	Negative Smears
Cases	38	7*	31

* Of the 7 cases in which smears were positive, 4 were in families in which there was only 1 sister.

of the infection was comparable to that in the cases of nonspecific infection. There was no evidence that the nonspecific infection was contagious except in the case of 2 sisters who had pinworm infestation of the vagina. It is interesting that a diagnosis of gonorrhea had previously been made, in spite of negative smears, on the assumption that the presence of vaginal discharge in both girls proved the contagiousness of the condition and therefore its gonorrheal nature. There was immediate and permanent cessation of the discharge on removal of the pinworms.

METHODS OF TREATMENT

The 121 treated patients whose cases we are reporting were classified into 8 groups, according to the method of treatment. Of these groups, 3 were treated with estrogenic substance and 5 by instillations of various substances.

LOCAL TREATMENT

With regard to the instillations, it was felt that the various chemical agents used should be administered in a uniform base so that their

49. Witherspoon, J. T., and Butler, V. W.: J. Pediat. **2**:463 (April) 1933.

relative merits could be properly evaluated. The base finally selected, after some preliminary trials, was a tragacanth jelly.[50] It meets the following essential requirements:

1. It is sufficiently fluid to be injected into the vagina without great pressure but solid enough to remain in the vagina when the child is in the erect position. In addition to any antiseptic effect, local application aids in recovery by its distention of the vaginal wall, the smoothing out of its folds and the consequent improvement of drainage.

2. It is soluble in water. This characteristic permits a fairly continuous freeing of the medicament into the vagina as the tragacanth is dissolved by the vaginal secretion. Ointment bases, on the other hand, coat the vaginal mucosa with a waterproof layer which retards, rather than enhances, drainage.

3. It is hygroscopic. This spongelike quality keeps the plug of tragacanth expanded against the vaginal walls and the vaginal surface of the cervix as the surface of the jelly dissolves and the newly exposed surface swells with absorbed secretion. It was frequently observed that at the end of three days the jelly was still exerting considerable tampon action.

4. It does not melt at body temperature. Bases that melt at body temperature drain out of the vagina in their fluid state as soon as they have been warmed to the temperature of the body.

5. It is compatible with the various antiseptics used.

Introduction of the Jelly.—The jelly is warmed to body temperature and placed in a 10 cc. syringe, to the tip of which is attached the distal 4 inches (10 cm.) of a sterile no. 12 French soft rubber catheter.[51] Enough of the jelly is expressed to fill the catheter and lubricate its tip. With the child in the dorsal lithotomy position and the vulva cleansed with soap and water, the catheter is passed into the vagina until resistance is encountered. This usually happens at a distance of between 1 and 3½ inches (from 2.5 to 9 cc.), depending on the age of the child. It is important that the catheter extend to the cervix in order that the vagina may be completely filled. The labia are then pressed together around the catheter, and the jelly is injected. After each cubic centimeter of the jelly is injected, the vaginal orifice should be inspected so that one may determine when the vagina has been filled. From 5 to 10 cc. is usually required to fill the vagina completely, although variations in the vaginal capacity of from 3 to 22 cc. have been found. The injection is continued as the catheter is being with-

50. This jelly is prepared as follows: To 2 drachms (7.68 Gm.) of tragacanth ribbon is added 8 ounces (236.8 cc.) of an aqueous solution of the antiseptic to be used and 4 grains (0.256 Gm.) of sodium benzoate. The mixture is allowed to swell and is then expressed through cloth. The jelly was developed with the cooperation of Mr. E. J. Backus, R.Ph.

51. One of the commercially prepared jellies was supplied in a collapsible tube with a nozzle tip. The catheter was attached to this tip, and the jelly was injected directly from the tube.

drawn, and a small amount of jelly is left between the labia minora. A snugly fitting sanitary pad should be applied before the child leaves the table.

The ideal time for administering the jelly is after the child is in bed for the night. In a few cases we were able to instruct the mother in its administration to our satisfaction. In most cases, however, the probability of incomplete filling of the vagina more than offset the advantage of recumbent position for several hours after the instillation. Some mothers sufficiently intelligent to carry out the treatment found that the child, while submitting at the clinic, did not cooperate with home treatment.

There was surprisingly little difficulty with the patients, either in the endoscopic examination or in the treatment. Occasionally a child had to be restrained, but only for the first few visits. Careful observation and questioning failed to reveal the development of any psychic trauma in the group.

The following local medicaments were used:

1. Two per cent mercurochrome in tragacanth jelly.

2. Merthiolate [52] in tragacanth jelly (1:1,000). Merthiolate is the sodium salt of ethylmercurithiosalicylate ($C_2H_5HgSC_6H_4COONA$).

3. Metaphen [52] in a jelly base made from the Indian locust bean (1:1,000). The properties of this base are similar to those of tragacanth. Metaphen is the anhydride of 4-nitro-5-hydroxymercuriorthocresol.

4. Two per cent strong protein silver in tragacanth jelly.

5. Lactic acid jelly—tragacanth jelly adjusted with lactic acid to a p_H of 4.

In addition, 10 per cent silver nitrate solution was used topically on erosions of the cervix and on granulomas. Potassium permanganate solution (1:5,000), 5 per cent sodium bicarbonate solution and boric acid solution were used as douches in cases of subacute and chronic involvement in which there was profuse or foul-smelling discharge.

The results of local treatment in the cases of gonorrhea are shown in table 9.

Frequency of Treatment.—At the outset of the study, treatments were given daily. In the majority of cases, however, it was found that the vagina was still packed with the jelly at the end of twenty-four hours. Since the effectiveness of the treatment is dependent on the constant application of the medication to the cervix, vagina and vulva, it was not necessary to repeat the instillation in these cases more than

52. The Abbott Laboratories and Eli Lilly & Co. supplied the metaphen jelly and the merthiolate used in this study.

every forty-eight hours. In some instances, in which the introitus was unusually small, the treatment was necessary only every third day. The average number of treatments was about four weekly.

The average duration of treatment for the cases of specific infection was 1.8 months, and for the cases of nonspecific infection, 1.33 months.

It has frequently been claimed that the course of the disease is protracted by prolonged local treatment. Pane,[53] among others, for this reason advised against any local instillations or endoscopic examinations. We occasionally felt that rest periods were advisable and temporarily discontinued treatment. The endoscopic examinations were continued. Apparently these rest periods were sometimes beneficial in shortening the acute stage of the infection. The summary of results, however, does not indicate that endoscopic examinations prolonged the course of the disease.

TABLE 9.—*Summary of Results of Local Treatment in Cases of Gonorrhea*

Treatment	Cases	Treatments per Week, Average	Duration of Treatment, Mo.	Endoscopic Examinations, Average No.	Rest Periods		First Negative Observation			Apparent Cure	
					Cases	Average Time, Months	Cases	Average Time, Months	Positive Throughout, Percentage	Average Time, Months	Percentage
Mercurochrome	23	3.87	2.53	5.7	7	1.90	18	1.60	21.78	4.20	47.8
Merthiolate	17	3.20	1.47	4.6	3	1.40	15	1.10	11.70	1.60	58.8
Lactic acid	11	3.00	2.20	4.2	1	1.50	7	2.00	36.30	3.50	37.2
Strong protein silver	10	3.66	1.33	5.0	1	0.75	9	1.25	10.00	1.57	80.0
Metaphen	10	4.70	1.55	5.5	4	0.90	9	1.43	10.00	2.10	60.0
All groups (average)	71	3.84	1.80	5.0	3	1.30	..	1.47	17.90	2.60	56.7
All groups except that treated with lactic acid	60	3.85	1.72	5.1	3.75	1.24	..	1.34	13.40	2.37	61.6

Duration of the Disease.—The time necessary for the production of a negative smear and the absence of objective signs was about one and one-half months. These indications, we found, did not signify a complete cure. As shown in table 10, in about 28 per cent of the cases smears and cultures were positive again after an average of about two months of negative observations. Patients were classified as being apparently cured only after weekly smears and cultures had been consistently negative for three months. They were then recorded as having been cured from the date of the first of the consecutive negative smears and cultures. The average time from the beginning of treatment necessary to produce an apparent cure was about two and one-half months. We hesitated to classify any of the series as conclusively cured, since about 2 per cent had a "flare" after the condition had been latent for

53. Pane, A. K.: New England J. Med. **207**:135, 1932.

from three to nine months. The custom of discharging a patient as cured after the symptoms have subsided and three consecutive smears have been negative is obviously inadequate.

Exacerbations and Reinfections (Table 10).—It is not always possible to distinguish between an exacerbation and a reinfection. One cannot expect the parent of an outpatient who has followed through the tedious course of treatment and of investigation of the family to admit of a new infection in the household. We were often unable to get the other members of the family into the dispensary for a reexamination. Undoubtedly, too, there were cases of recurrence of the discharge in which the mother carefully stayed away from the clinic because of the danger of having her child again excluded from school. We attempted, however, to include under the heading of exacerbations (or "flares") only the cases in which we could without any reasonable doubt exclude

TABLE 10.—*Exacerbations in Patients with Gonorrhea Who Received Local Treatment*

Treatment	Total Patients Treated	"Flares" After First Negative Observation			"Flares" After Apparent Cure	
		Number of Patients	Months After Treatment Started	Percentage of Total Patients	Number of Patients	Months After Apparent Cure
Mercurochrome	23	10	3.6	43.5	1	9
Merthiolate	17	5	1.15	29.4	0	..
Lactic acid	11	3	2.3	27.2	1	7
Strong protein silver	10	1	1.2	10.0	0	..
Metaphen	10	3	1.4	30.0	0	..

continued or new exposure. It is conservative to say, with the evidence on hand, that exacerbations are possible as long as nine months after a child is apparently cured.

Comparison of Various Substances Used in Local Instillations (Table 9).—The lowest percentage of apparent cures was obtained with lactic acid jelly. Lactic acid was used because of the report of J. Rosenstern [54] in his monograph on changes at puberty. In this excellent and exhaustive work he described a change in 10 cases from the normal coccal vaginal flora to a bacillary (Bacillus Döderleini) flora at an early stage of puberty. This was accompanied by a shift in the reaction of the vaginal secretion from the normal p_H of the child, between 6 and 7, to the normal p_H of the adult, between 4 and 4.9. We were able to confirm these figures with our series. He also demonstrated the fact that the well known spontaneous cure of juvenile gonorrhea at puberty occurs simultaneously with these changes. The entire process—the shift in the flora and the reaction and the disappearance of the gono-

54. Rosenstern, J.: Ergebn. d. inn. Med. u. Kinderh. **41**:789, 1931.

coccus—occurs in a short time; in 1 case it took place within ten days. That the shift in chemical reaction is due to the appearance of glycogen in the vaginal epithelium and its conversion into lactic acid by a glycogenase or by bacterial action has been repeatedly confirmed, most recently by Cruikshank.[55] We used the lactic acid jelly in conjunction with an acid ash diet in an attempt to produce the end-result of this change artificially. We were not able to change the chemical reaction by this method, and the p_H value of all the 11 patients treated with lactic acid jelly remained between 6 and 7.[56] The therapeutic result must have been due, then, to the improved drainage resulting from the distention of the vaginal walls, and the patients may be considered a control group from the point of view of the relative effectiveness of the various bactericidal agents used.

Of the other medicaments, strong protein silver was outstanding as to the shortest duration of treatment, the smallest number of exacerbations, the shortest course of the disease and the highest percentage of apparently cured patients—80 per cent in an average time of 1.57 months. Metaphen ranked next, with 60 per cent of the patients apparently cured in an average time of 2.1 months. Merthiolate showed similar results; 58.8 per cent of the patients were cured in 1.6 months. The results with merthiolate and metaphen were roughly parallel throughout the study; metaphen, however, being a somewhat thinner jelly, required more frequent instillations. Mercurochrome was the least effective agent except lactic acid, being associated with the longest duration of treatment, the highest number of exacerbations, the most frequent rest periods and the lowest percentage of apparently cured patients, which was only 10 per cent greater than that in the group treated with lactic acid.

In evaluating these results, the stage of the disease must be considered. In general, juvenile gonorrhea is more amenable to treatment in the chronic than in the acute stage. About 86 per cent of the patients treated with mercurochrome were in the acute or the subacute stage, while 60 per cent of the group treated with strong protein silver were in the acute or the subacute stage (table 11). More favorable results have been reported with the use of mercurochrome. Some authors[57] have used 5 per cent solutions.

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55. Cruikshank, R.: J. Path. & Bact. **39**:213 (July) 1934.

56. R. M. Lewis and E. L. Adler (Gonorrheal Vaginitis: Results of Treatment with Different Preparations and Amounts of Estrogenic Substance, J. A. M. A. **106**:2054 [June 13] 1936) found that the vaginal secretion of untreated patients had p_H values between 6.8 and 7.4.

57. Peterson, S. C.: Canad. Pub. Health J. **24**:577 (Dec.) 1933. Williams.[15] Witherspoon and Butler.[49]

The results of treatment in the cases of nonspecific infection are shown in table 12.

The average frequency of treatments in these cases was slightly higher than that in the cases of gonorrhea—4.2 treatments weekly.

The average duration of the nonspecific infection under treatment was 1.24 months, about one-half that of the specific infection. Regardless of the type of treatment, all the patients were cured. The only

TABLE 11.—*Stage of Disease at Beginning of Various Forms of Treatment*

Treatment	Specific (Gonorrheal)				Nonspecific (Nongonorrheal)			
	Acute	Subacute	Chronic	Total	Acute	Subacute	Chronic	Total
Mercurochrome	18	2	3	23	2	2	3	7
Merthiolate	13	1	3	17	1	..	2	3
Lactic acid	9	..	2	11	..	..	..	..
Strong protein silver	4	2	4	10	1	2	1	4
Metaphen	7	1	2	10	2	2	..	4
Theelin in an aqueous solution	7	..	..	7	..	..	..	..
Theelin in oil	6	..	9	15	..	..	..	..
Placental extract	8	..	2	10	..	..	..	..
Total (cases)	72	6	25	103	6	6	6	18
(Percentage)	70	5.8	24.2		33.3	33.3	33.3	

TABLE 12.—*Summary of Results of Local Treatment in Cases of Nongonorrheal Infection*

Treatment	Cases	Treatments per Week, Average	Duration of Treatment, Mo.	Endoscopic Examinations, Average No.	Rest Periods		First Negative Observation		Positive Throughout, Percentage	Apparent Cure	
					Cases	Average Time, Months	Cases	Average Time, Months		Average Time, Months	Percentage
Mercurochrome*	7	3.83	1.04	4.90	1	1.0	7	0.80	0	1.90	100
Merthiolate	3	3.00	1.50	5.00	0	0.0	3	0.50	0	0.50	100
Strong protein silver	4	4.00	1.90	6.20	0	0.0	4	2.80	0	2.80	100
Metaphen	4	6.00	0.90	5.30	2	0.7	4	0.75	0	0.75	100
All groups (average)	18	4.20	1.33	5.33	0.75	0.4	..	1.20	0	1.20	100

* In one case itching, burning and a scanty watery discharge developed when orange juice was taken.

comparison of the efficiency of the various medicaments is in regard to the time necessary to produce a cure. This was as follows: merthiolate 0.5 months, metaphen 0.75 months, mercurochrome 1.9 months and strong protein silver 2.8 months. The smaller number of patients with nonspecific infection and the wide variety in the type of infection prohibit acceptance of these figures without further analysis.

One patient with nonspecific infection who was treated with mercurochrome continued to have an intermittent discharge for a period of

four months. A filtrate was made of the predominating organism (Streptococcus viridans) and was incorporated in tragacanth jelly. Daily instillations of this filtrate jelly were given for six days and produced cessation of the discharge and disappearance of pus cells and of the organism. The child has at the time of writing remained apparently cured for three and one-half years.

TREATMENT WITH ESTROGEN

For the groups treated with estrogen, the general procedure was that advocated by Lewis [58] and followed by Brown,[59] Huberman and Israeloff,[31] Miller [60] and others. The estrogenic substance was given hypodermically. Three preparations were used: an aqueous solution of theelin [61] (7 cases), theelin in oil (15 cases) and a placental extract prepared by Dr. S. J. Fogelson of the department of experimental surgery (10 cases).[62] All the children had positive smears and cultures for gonococcus at the onset of the treatment. None of them had received any other treatment for at least one month. All the patients were observed for a year or longer after the cessation of treatment.

Local Findings.—Characteristic changes occurred in the genitalia during the administration of the estrogenic substance. These changes were dependent on the amount of estrogen given, rather than on the element of time.[63] After the administration of from 700 to 1,000 rat units the vagina assumed a bright red, dry and granular aspect. After from 1,500 to 2,000 rat units this was gradually replaced by a pale, smooth and soggy appearance. With about 3,000 rat units the mucosa was smooth, pale, dry and somewhat glistening.

After the administration of from 1,000 to 1,500 rat units the cervix became larger, more deeply red and smooth. After from 1,800

58. Lewis, R. M.: Am. J. Obst. & Gynec. **26**:593 (Oct.) 1933.

59. Brown, J.: J. Iowa M. Soc. **24**:331 (July) 1934.

60. Miller, J. R.: Am. J. Obst. & Gynec. **29**:533 (April) 1935.

61. Parke, Davis & Company supplied the aqueous solution of theelin and the theelin in oil used in this study.

62. This extract is prepared as follows: A benzene extract of fresh placenta is first purified and then evaporated to dryness. The residue is taken up in 85 per cent alcohol, centrifugated to remove insoluble oils and again evaporated to dryness. The resulting residue is taken up in water containing hydrochloric acid, filtered, neutralized with sodium hydroxide and concentrated by boiling so that 1 cc. contains a minimum of 200 mouse units per cubic centimeters as determined on castrated female-mice (Lagueur, E.; Hart, P. G., and de Jongh, S. L.: Lancet **1**:1126, 1927).

63. A. A. Werner and W. D. Collier (Production of Endometrial Growth in Castrated Women, J. A. M. A. **101**:1466 [Nov. 4] 1933) noted that endometrial growth in castrated women occurred when 2,800 rat units had been given, irrespective of the time consumed in reaching this dose. They designated 2,800 rat units as the minimum clinical dose.

TABLE 13.—*Data on Patients Treated with Estrogen*

Patient	Age	Total Amount of Substance, Rat Units	Duration of Treatment, Days	Other Treatment		Endoscopic Examinations	First Negative Observation, Days	"Flare" Within 3 Mo. Time, Days	Apparent Cure, Days	"Flare" After Apparent Cure		Reactions	
				Preceded by	Followed by					0-6 Mo.	6-12 Mo.	Local	General
AG-80	6	2,500 AT	40	PE 4 mo. prior	.....	5	7	..	7	..	..	Theelin; pubic hair	
AG-90	7	3,600 AT	56	.....	.....	6	34	34	48	..	..	Theelin; pubic hair	
AG-91	9	2,600 AT	105	PE 2 mo. prior	.....	7	7 (smear) 66 (culture)	..	66	..	..	Theelin; pubic hair	
AG-87	4	2,200 AT	71	.....	.....	11	47 (smear) 92 (culture)	..	92	..	..	Theelin; breasts; pubic hair	Marked
AG-72	5	500 AT	7	Merthiolate 6 wk. prior	Metaphen after 4 mo.	3	7	..	7	Yes	..	0	
AG-84	4	5,300 AT	76	.....	Metaphen after 5 mo.	14	146	..	No	..	..	Theelin except in cervix; pubic hair	
AG-95	2	2,600 AT	76	.....	.....	5	7	..	7	..	..	Theelin	
CG-96	11	3,000 TO	14	PE 4 mo. prior	.....	8	7	..	7	..	..	Theelin; breasts; pubic hair	*
CG-97	7	4,650 TO	28	.....	.....	10	150	..	150	..	Yes†	Theelin; breasts; pubic hair	Marked
AG-98	7	3,000 TO	14	.....	.....	3	24	..	24	..	..	Theelin; breasts; pubic hair	Moderate
CG-99	8	3,000 TO	12	Merthiolate 1 yr. prior	.....	5	7	..	7	..	‡	Theelin; pubic hair	
AG-100	9	3,000 TO	11	.....	.....	6	10	..	10	..	..	Theelin; pubic hair	§
CG-105	9	6,000 TO	47	Strong protein silver	Strong protein silver	5	39	54	No	..	..	Theelin; pubic hair	
CG-106	6	6,000 TO	47	Strong protein silver	.....	4	30	..	30	..	..	Theelin; breasts	
CG-107	7	2,850 TO	16		Strong protein silver	2	12	34	No	..	..	Theelin; breasts	Mild

AG-108	6	5,700 TO	33	.....	.....	3	21	..	21	..	..	Theelin; pubic hair; breasts	
CG-109	9	6,000 TO	23	.....	.....	3	5	..	5	..	..	Theelin; pubic hair	
AG-110	5	6,000 TO	23	.....	Strong protein silver	7	31	40	No	..	..	Theelin except in cervix	
CG-111	10	6,000 TO	23	.....	.....	2	12	..	12	..	..	Theelin; pubic hair	
CG-112	8	6,000 TO	23	.....	.....	3	15	..	15	..	..	Theelin; pubic hair	
CG-113	9	6,000 TO	26	.....	.....	2	25	..	25	..	..	Theelin; pubic hair	
CG-114	10	6,000 TO	28	.....	.....	2	19	..	19	..	..	Theelin; breasts	
AG-5	8	5,500 PE	14	Mercurochrome 1 mo. prior	.....	4	15	..	15	Yes	Yes‖	0	
AG-83	6	4,500 PE	13	.....	.....	4	13	27, 41	44	..	..	0	
AG-86	4	3,500 PE	22	.....	.....	5	7	..	7	..	Yes, for 2 wk.	Theelin; pubic hair	
AG-75	8	4,000 PE	28	Merthiolate 1 mo. prior	Strong protein silver	4	21	..	21	..	Yes	Theelin	
AG-77	2	4,500 PE	21	.....	.....	5	14	70	81	..	..	Theelin	
CG-60	8	4,500 PE	27	.....	.....	5	7	..	7	..	..	0	
AG-91	8	4,500 PE	17	.....	Theelin at 56 days	6	19	50	No	..	..	Theelin except in cervix	
AG-92	9	4,500 PE	14	.....	Metaphen at 48 days	8	No	..	No	..	..	0	
AG-80	6	4,500 PE	21	.....	Theelin at 4 mo.	9	43	69	No	..	..	Theelin except in cervix; pubic hair	Mild
CG-96	11	2,750 PE	12	.....	Theelin in oil at 4 mo.	12	7	76	No	..	..	Theelin except in cervix; breasts; pubic hair	

Key: AG = acute gonorrhea; CG = chronic gonorrhea; AT = theelin in an aqueous solution; TO = theelin in oil; PE = placental extract.

* Discharge continued for eight months; smears showed few pus cells and many epithelial cells; pure culture of B. Döderleini for six weeks; p_H, 6.8; thereafter only a green-producing streptococcus in culture; no further treatment.

† "Flare" after eight months for two weeks, when child started acrobatic dancing; observations then negative for five months; reinfection improbable.

‡ Intermittent library paste discharge for seventeen months to time of writing; smears showed many epithelial cells, no pus cells and mixed flora.

§ Discharge continued for three months, with many epithelial cells and few pus cells; pure culture of B. Döderleini; p_H, 7.2; "flare" after eleven months, for one week; negative observations for eighteen months.

‖ "Flares" occurred with infections of the upper part of the respiratory tract; positive smear with first "flare"; negative smears with subsequent "flares."

to 2,000 rat units it appeared paler and edematous. Erosions were less evident at this stage, and in the majority of cases they disappeared by the time 3,000 rat units had been given. The secretion diminished in amount after about 1,000 rat units and gradually changed from a purulent or mucopurulent to a white, library paste type of discharge. The changed character of the secretion was striking when it was spread on a glass slide, for instead of a dull, cloudy film, the smear had a glistening ground glass appearance. This has been reported by Miller, and is due, as he stated, to the decrease in pus cells and the increasing number of epithelial cells. At the height of the reaction epithelial cells were often so numerous as to give a flagstone picture microscopically. We agree with Miller that the appearance of epithelial cells in large numbers is an index of the cornification of the vaginal epithelium and can adequately replace biopsy as a control of the reaction to estrogen.

The changes at the introitus paralleled those of the vagina except that the soggy, water-logged appearance occurred earlier (after from 1,000 to 1,500 rat units) and continued throughout the administration of the estrogenic substance. The urethral orifice and the clitoris showed no change, which is not unexpected, since they are not derived from müllerian tissue.

The changes in the vagina and the cervix resembled those we have watched through early puberty. In the normal pubertal development, the p_H of the secretion changes from 7 to 4 or 4.9 coincident with a shift from a coccal to a bacillary flora.[64] Recently Lewis and Adler[65] reported a shift to p_H values of 4.5 to 6.2 in patients receiving an estrogenic substance. They did not state whether the flora changes with the change in the p_H. Hall and Lewis[66] found that for immature monkeys, which have a vaginal p_H similar to that of the immature girl, the value changed from 5.4 to 5.7 with administration of estrogen. In our series the p_H values and the flora in patients receiving the substance were too contradictory for comment at this time.

The phenomena described constitute a typical reaction to estrogen, or Lewis reaction (Miller), as it occurred in 27 patients of the series. It tended to continue as long as the substance was being given. About three weeks after discontinuance of the treatment the reaction began to subside, and the normal juvenile appearance of the genitalia was reestablished in from six to eight weeks. In 1 patient (CG-99, table 13) a girl of 8 years, the reaction had not subsided after seventeen months. The changes described continued, and there was a scanty intermittent library paste discharge containing many epithelial cells, few pus cells and no

64. Soeken, G.: Ztschr. f. Kinderh. **47**:27, 1929. Rosenstern.[54]

65. Lewis, R. M., and Adler, E. L.: Gonorrheal Vaginitis, J. A. M. A. **106**: 2054 (June 13) 1936.

66. Hall, V., and Lewis, R. M.: Endocrinology **20**:210 (March) 1936.

gonococci. No further adolescent changes had occurred. In 2 other children (CG-96 and AG-100) the reaction continued for eight months and four months, respectively.

Untoward Reactions.—Scanty pubic hair developed in 5 of the 7 children treated with an aqueous solution of theelin, in 11 of the 15 treated with theelin in oil and in 3 of the 10 treated with placental extract. Enlargement of the breasts occurred in 1 child treated with an aqueous solution of theelin, in 7 treated with theelin in oil and in 1 treated with placental extract. In 1 of these (CG-97), 6 years old, there was marked engorgement, and a milky fluid could be expressed. In 3 children (1 not included in this series) there were marked constitutional reactions, in 1 a moderate reaction and in 1 a mild reaction. A typical case is that of AG-87, aged 3 years:

> Fifty units of theelin in an aqueous solution was given daily from Oct. 26 to 31, inclusive, 1934. On the night of October 31 the child vomited and had severe bearing down abdominal pains, which radiated down both legs. The rectal temperature was 102 F. There was an abdominal defense reaction in both lower quadrants, but no rigidity. The results of examination were otherwise negative. The white blood count was 26,000 with 69 neutrophils, 30 lymphocytes and 1 basophil. The symptoms continued for twenty-four hours. Forty-eight hours after the onset the white blood count was 8,600, with a normal differential count. Treatment was resumed on November 3. On November 6 there was mild abdominal pain of a few hours' duration and a rectal temperature of 100.2 F. The daily administration of theelin was continued for twenty-two days without further symptoms.

These constitutional reactions do not depend on the total dose. They all occurred in the first week of treatment. At the time of the reaction from 150 to 600 rat units had been given. Similar but apparently less intense reactions have been reported by Lewis, Reading [67] and others.

In 4 cases, roentgenograms of the wrists taken before the onset of treatment and after subsidence of the reaction to the estrogen did not reveal any abnormality in the ossification. We have not observed any clinical evidence of thyroid hyperplasia or albuminuria such as has been reported by Kunde and others [68] in animals after the prolonged use of an estrogenic substance. We did not have an opportunity to observe the ovaries in any of our patients. Miller reported that biopsy of an ovary of a child in his series after a total dose of 1,000 rat units given in ten days revealed nothing abnormal. Allen and Diddle [69] compared the ovaries and uteri of monkeys before and after relatively large doses of theelin. They concluded that the changes which occurred were not sufficient to interfere with normal function.

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67. Reading, Boyd: South. M. J. **28**:464 (May) 1935.

68. Kunde, M. M.; D'Amour, F. E.; Carlson, A. J., and Gustavson, R. G.: Am. J. Physiol. **95**:630 (Dec.) 1930.

69. Allen, E., and Diddle, A. W.: Am. J. Obst. & Gynec. **29**:83, 1935.

Results.—The numbers of the patients in table 13 indicate that there were 20 with acute gonorrhea (AG) and 12 with chronic gonorrhea (CG) in the entire series. The short course makes it necessary to record the time in days.

The average time of producing an apparent cure was about one month. In 9 cases it ranged from seven to twenty-one days. (In the cases in which local treatment was used the average time it took to produce a cure was about two and one-half months.) A decidedly greater percentage of the children treated with estrogen were apparently cured than were cured with local treatment, the figures being 85.7 per cent for theelin in an aqueous solution, 80 per cent for theelin in oil and 60 per cent for placental extract. On the other hand, there were exacerbations in a larger proportion of the children treated with estrogen—in 1 of the 6 apparently cured children who received theelin in an aqueous solution, in 2 of the 12 children with a latent infection who received theelin in oil and in 2 of the 6 children with a latent infection who received placental extract. As an end-result, the outcome was permanent and satisfactory in 19, or 59.3 per cent of the 32 children. This is slightly less favorable than the results with the children who received local treatment, 61.6 per cent of whom were apparently cured.

In 3 of the 24 children who showed no bacteriologic evidence of gonorrhea for more than a year, an apparently nonspecific discharge continued for from three to ten months following the disappearance of the gonococcus. This also occurred in 2 children treated with estrogen who were not included in this series. Although these children were considered cured because of the negative bacteriologic observations, we cannot be sure that they should be so classified.

Since all the children treated with estrogen had cervicitis, it is apparent that the substance produced changes antagonistic to the gonococcus in the cervix as well as in the vagina. Hartman [70] and Lewis [58] reported leukocytic infiltration of the cervix coincident with the cornification of the vaginal epithelium. Endoscopic inspection with our series showed definite changes in the appearance of the cervix. While these changes were not as striking or as early as those in the vagina, it is significant that they did not occur at all in 6 of the 8 patients who exhibited unsatisfactory results from the treatment. Moreover, all the patients with recurrent infection showed infection in the cervix. It is possible that with continued administration of the estrogenic substance or with larger doses, a reaction in the cervix would have occurred. It may be significant that the most favorable results reported in children who have been observed for long periods have been obtained when large total

70. Hartman, quoted by Lewis.[58]

doses have been given. Nabarro and Signey,[71] who reported a high percentage of "cures," gave total doses of from 20,000 to 112,000 mouse units (from 6,000 to 33,600 rat units). Goldberg and his co-workers,[72] who obtained favorable results in 14 of 16 patients, gave from 2,000 to 23,300 rat units and less than 4,000 in only 2 cases. The average amount was 12,000 rat units. On the other hand, Witherspoon,[73] whose results were entirely unfavorable, gave total doses (from an estimation of his table) of from 2,500 to 5,000 rat units. Miller, although he gave 1 patient 19,230 rat units, rarely gave more than 4,000 rat units. His average dose was under 3,000 rat units. He reported good results in 19 of 42 patients, temporary results in 16 and unsatisfactory results in 7. A comparative summary of the results in our series of 32 patients with an average dose of 4,228 rat units, indicates good results in 19, temporary results in 5 and unsatisfactory results in 8.

Further Treatment When Treatment with Estrogen Gave Unsatisfactory Results.—Three of the patients showing unsatisfactory results were not treated further, and the infection eventually subsided (table 13:CG-97, CG-99 and AG-5). Three others (AG-91, AG-80 and CG-96) were given between 2,500 and 3,000 rat units of theelin, or an average of 6,610 rat units. Their smears promptly became negative, although 1 (AG-91) continued to have a positive culture for sixty-six days. Several workers[74] have suggested that with recurrences after treatment with estrogen smaller doses than are necessary in the original treatment will effect a cure.

A striking parallel to this theory was demonstrated with the 7 recurrences that were treated with local medication. The local treatment was continued for an average of one and a half months, with a permanent cure in about one month in all cases (table 14). These results are far better than the results of the original local treatment (table 7). The use of local treatment in cases of recurrence has the important advantage over the further use of theelin of reducing the total amount of theelin necessary.

In the past year, since the series of children being reported on was closed, we instituted a routine treatment in cases of gonorrhea of 6,000 rat units of theelin in oil given in twenty-three days. Children who

71. Nabarro, D., and Signey, A. G.: Lancet **1**:604 (March 16) 1934.

72. Goldberg, L. E.; Minier, C. L., and Smith, E. L.: J. Pediat. **7**:401 (Sept.) 1935.

73. Witherspoon, J. T.: Treatment of Gonorrheal Vulvovaginitis in Childhood with Ovarian Follicular Hormone, Am. J. Dis. Child. **50**:913 (Oct.) 1935.

74. Limper, M. A., and Hieronymus, E. E.: J. Pediat. **9**:240 (Aug.) 1936.

had apparently not been cured in this time, as well as those who had had a recurrence, were given strong protein silver jelly for one and a half months. The results were so uniformly successful that we delayed until recently to follow the example of TeLinde and Brawner [75] in using theelin in vaginal suppositories.

These authors treated 22 patients with an average of 3,600 rat units of theelin in oil and 17 with an average of 1,967 rat units in suppositories. The results were roughly parallel in the two groups as to the time of the reaction to the theelin, the time of the cure and the frequency of recurrences. However, only 60 per cent of the patients treated with theelin in oil in whom the infection recurred responded to further estrogenic substance, whereas all the children treated with

TABLE 14.—*Recurrences After Treatment with Estrogenic Substance*

Patient	Age	Total Amount of Estrogenic Substance, Rat Units	Days	Recurred, Days	Subsequent Treatment		Apparently Cured, Days	"Flares" Within One Year
					Drug	Days Treated		
CG-105	9	6,000 TO*	47	54	Strong protein silver	29	29	0
AG- 75	9	4,000 PE†	23	210	Strong protein silver	22	18	0
CG-107	7	2,850 TO	16	34	Strong protein silver	40	32	9
AG-110	5	6,000 TO	23	40	Strong protein silver	41	35	0
AG- 72	6	500 AT‡	7	220	Metaphen	49	18	0
AG- 84	4	5,300 AT	76	Positive throughout	Metaphen	59	45	0
AG- 92	9	4,500 PE	14	Positive throughout	Metaphen	75	45	0
Average		4,878	30	..	.....	45	34	0

* Theelin in oil.
† Placental extract.
‡ Theelin in an aqueous solution.

theelin in suppositories were permanently cured with further treatment with suppositories. The children treated with theelin in oil received an average total of 7,050 rat units in the original course of treatments and 6,425 rat units during the recurrence. With the theelin in suppositories, the original average total dose was 1,967 rat units and that during recurrence 2,100 rat units. Treatment with suppositories, then, offers, besides the greater ease of administration, the further advantage over the intramuscular injection of theelin of requiring a much smaller dose, even in cases in which the infection recurs.

We treated 6 patients with 2,100 rat units of theelin in suppositories in four months. Five of these were apparently cured. One had a recurrence and was given instillations of strong protein silver jelly. At the time of writing she has apparently been well for one month. It seems

75. TeLinde, R. W., and Brawner, J. N., Jr.: Am. J. Obst. & Gynec. **30**:312 (Oct.) 1935.

possible that we will be able to reduce the total amount of theelin administered by this method below the total dose used by TeLinde and Brawner.[76] Limper and Hieronymus,[74] who gave an average of 4,000 rat units to 27 patients, expressed the consensus in saying that treatment with estrogen should be limited to the smallest dose and the shortest duration of treatment compatible with consistently good results. The use of local treatment in cases of recurring infection will, if confirmed, be a step in this direction.

COMMENT

A few practical points in the routine management of infections of the lower part of the genital tract are worthy of comment.

The importance of rest, especially in the acute stage of the infection, is not sufficiently appreciated. We have frequently seen exacerbations following rope jumping, bicycle riding or even a long walk. While it is impracticable to confine the patients to bed, exercise should be reduced to a minimum. Local irritation, such as results from tight underwear or masturbation, must be guarded against.

The anatomy of the juvenile vulva is such that when the child is in a sitting position the vestibular space is in contact with the seat. Unless the clothing offers the proper protection, the vestibular space is open to contamination. The popular "French panties," with a narrow, loose strip of cloth over the vulva and perineum are probably a common factor in genital infection. Underwear which fits snugly around the thighs or bloomers are necessary for adequate protection.

Infection elsewhere in the body, especially in the upper part of the respiratory tract, acute eczema and the exanthems frequently cause exacerbations of both the gonorrheal and the nonspecific types of infection. Allergic vulvitis, also, can apparently cause a flare-up of either type of infection. Most of these exacerbations subside spontaneously with the removal of the cause. We have found it unnecessary to give further local treatment or theelin during these periods.

The usual routine method of obtaining material for smears is not satisfactory. In the case of acute infection, in which the discharge is profuse, the pus, however obtained, is probably adequate. But when pus is scanty or absent at the introitus, it is necessary that the material be obtained from the sites at which the infection persists—the cervix and the urethra. Although an endoscopic visualization of the cervix is not a difficult procedure, it is not necessary in the routine bacteriologic examination. An adequate applicator and the proper technic will insure accurate results. The tip of a long wooden applicator is dipped in collodion and wrapped with cotton. This keeps the cotton from being

76. Further experience is bearing out this contention. The details will be included in a subsequent report.

lost in the vagina. With the child in the dorsal lithotomy position, the labia minora are separated to the point of opening the vaginal orifice. The sterile applicator is introduced with a spiral motion to keep the hymen from adhering to the cotton. The applicator is allowed to assume its own direction and is introduced, still with a spiral motion and with a minimum of pressure, until resistance is encountered. The tip of the applicator is now in the posterior fornix. By depressing the distal end, the tip is lifted over the cervix. It is rolled so that the cotton is wiped over the cervix and is then withdrawn. The applicator is rolled, not smeared, onto the surface of a slide, so as to minimize the breaking up of pus cells. (The intracellular position of the gonococcus is an important factor in its identification.) The tip as well as the sides of the applicator must be rolled onto the slide in order that cervical as well as vaginal material will be deposited. The procedure takes only a few seconds and does not cause any discomfort to the child.

Urethral smears are taken with cotton rolled to a point on a toothpick. The urethra can be entered for a distance of from 3 to 4 mm. without the child's feeling discomfort.

SUMMARY AND CONCLUSIONS

Infection of the lower part of the genital tract in girls is more common and more important than is generally realized.

One hundred and twenty-one patients who were treated were studied clinically, bacteriologically and sociologically over a period of five years. In the course of the study, 842 endoscopic examinations were made, 264 cultures were studied and over 2,000 smears were examined.

A method for obtaining uncontaminated material from the various levels of the lower part of the genital tract was developed.

In 76.6 per cent of the cases the infection was gonorrheal, and in 23.4 per cent, nonspecific.

The age incidence and seasonal variation are discussed.

The vulva was always involved, the cervix almost always and the urethra in about one half of the cases of gonorrhea and one fourth of the cases of nonspecific infection. The vagina was involved in 41 per cent of the cases of gonorrhea and in 19 per cent of the cases of nonspecific infection. Vaginitis occurred usually only in the acute stage. No instance of gonorrheal proctitis was found.

Cervical involvement must be considered in any rationale of treatment.

No qualitative clinical distinction was found between the gonorrheal and the nonspecific infections. The final differential diagnosis is based entirely on the examination of smears and cultures.

There are no characteristic patterns in the flora of the patients with nonspecific infection. Three patients with primary invasion of the genital tract by B. dysenteriae Flexner were observed. T. vaginalis was observed in 2 cases.

Smears and cultures together are more accurate in the diagnosis of gonorrhea than either alone. Adequate methods for obtaining material for smears and cultures are described.

Ascitic agar is a satisfactory medium for the growth and isolation of the gonococcus.

In over half the cases of gonorrhea the infection was contracted in the home. In all but 1 case the source of infection was an adult.

Tragacanth jelly has been developed as a vehicle for the application of local treatment.

Two per cent strong protein silver in this vehicle was the most effective germicide used. It resulted in an apparent cure in 80 per cent of the cases in 1.5 months, with 1.33 months of treatment and with recurrences in 10 per cent. Two per cent mercurochrome was the least effective germicide.

The average duration of treatment in the cases of nonspecific infection was 1.33 months, with apparent cure in all cases in an average time of 1.2 months.

The characteristic local changes resulting from the administration of estrogen in 32 cases are described.

Untoward constitutional reactions occurred in 3 cases; engorgement of the breasts and growth of pubic hair resulted frequently.

While a larger percentage of the patients were apparently cured in a shorter time in the group treated with estrogen than in the group who received local treatment, there was a higher incidence of exacerbations in the former group. In the final analysis, the results were similar in the two series.

In all patients showing an unsatisfactory response to treatment with estrogen there was continued or recurrent cervicitis. With these patients, local treatment following the treatment with estrogen resulted in a permanent cure in about one month.

The use of theelin suppositories in a small series of cases points to a further reduction in the total amount of estrogen necessary to effect a cure.

Since treatment with estrogen should be limited to the smallest dose and the shortest duration of treatment compatible with consistently good results, the use of theelin in oil or in suppositories, with adjuvant local

treatment in cases in which the infection recurs or does not respond, offers the most satisfactory form of treatment for gonorrheal infection of the lower part of the genital tract.

Dr. Isaac A. Abt and Prof. Alexander A. Day gave advice throughout this study, and Miss Florence Olmstead, R.N., director of nursing, lent her cooperation.

DISCUSSION

Dr. Alexander Day: Notwithstanding the enormous amount of investigation of the gonococcus and the infections which it produces, there are few points on which opinion is unanimous. While it is true that in the majority of cases the diagnosis can be established on clinical evidence and the stained smear, yet in a minority the smear fails to bear out the clinical diagnosis, and in a still smaller minority the smear may even give false confirmation owing to the presence of other bacterial forms which simulate the gonococcus. Cultural methods as a further aid in diagnosis are being increasingly recommended. Findings in the series reported here support this recommendation. Of 88 positive smears, cultures were positive in 70, but, of 105 negative smears, cultures were positive in 10 and, of 21 suspicious smears, cultures were positive in 15. In a few cases gram-negative cocci other than gonococci, Micrococcus catarrhalis and unidentified forms were recovered by culture.

Dr. Maurice L. Blatt: Dr. Reichert's thesis is both interesting and instructive. The organization of his work makes the paper easily understood.

I wish to call attention to the picture presented by the cervix. In my experience and that of my associates a positive diagnosis and a judgment as to permanency of cure may not be based on smears but may be based on the appearance of the cervix itself. Punctate hemorrhages of the cervix are the criteria on which we base our statement about cure. When these lesions are no longer seen, we believe that the child is cured. When they are present, it has been our experience that the disease will recur.

Negative smears and negative cultures may be repeatedly obtained even in the presence of these lesions.

As regards treatment, we have found gelatin to be a satisfactory vehicle for the antiseptic. In our experience the hormones have been effective after local treatment has been used for some time. The hormones have seemed to clear up the residual infection.

Dr. Samuel J. Hoffman: I should like to know how the treatment was carried out in the homes of these patients. Following up Dr. Blatt's remarks, my colleagues and I never consider patients cured until the cervix is entirely free from all punctate hemorrhages. I also wish to ask Dr. Reichert if he has any idea, through his social service department, as to what the incidence of infection is and also if he has any ideas about the methods of transmission.

Dr. J. L. Reichert: I agree with Dr. Blatt that punctate hemorrhages of the cervix are not seen in cured patients. Neither can a patient be considered free from infection if the cervix is friable, deeply cryptic or hypertrophic. Dr. Blatt's results in using local treatment preceding glandular therapy strengthen an impression that if treatment does not destroy the gonococcus it still vitiates the organism and leads to more satisfactory results in the ensuing medication.

Almost all the patients whom my co-workers and I have attended received their treatment in the dispensary. While local treatment is more effective when

given at bedtime, we feel that the probability of incomplete filling of the vagina with jelly when it is given by the mother more than offsets the advantages of several hours in a recumbent position after treatment. The few patients who were treated at home were closely supervised by visiting nurses. One of the several interesting facts brought out by the excellent work of the social service department was that spread of the infection from an adult to a child, instead of between children, was an almost constant finding.

Ten per cent of the gonorrhea in females examined in the dispensary was in immature girls.

I appreciate your kind reception of this paper. The interest of Dr. Day and Dr. Abt in our work was unfailing, and Miss Florence Olmstead, the director of nursing, really did all the hard work.

SODIUM MANDELATE AS A URINARY ANTISEPTIC

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Since the original work of Rosenheim on the use of mandelic acid in the treatment of urinary infections [1] was reported, a few additional series of cases have been recorded.[2] The keen thought which fostered Rosenheim's experiments and the logical way in which they were pursued are worth mention. Prompted by Fuller's demonstration that the effective bactericidal agent produced by the ketogenic diet is betahydroxybutyric acid,[3] Rosenheim examined a considerable number of chemically similar substances in search for one which would exhibit the following characteristics: (1) nontoxicity when taken by mouth, (2) excretion in the urine in an unchanged condition and (3) bactericidal action in the urine. Mandelic acid (or its sodium salt) was the one chemical examined which fulfilled all of these requirements. Because of the favorable results reported in the three series of cases to which reference has been made, it has seemed desirable to extend the work to the field of urinary infections in infants and children. I agree with the many recent writers on the subject of ketogenic diet in the treatment of urinary infections that such a diet is effective in a large percentage of cases,[4] but I also feel that, as Rosenheim points out, it is expensive and distasteful and does not lend itself readily to use in the treatment of children in the home.

From the Department of Pediatrics, Harvard University Medical School, and the Infants' and the Children's Hospitals, Boston.

1. Rosenheim, M. L.: Mandelic Acid in the Treatment of Urinary Infections, Lancet **1**:1032 (May 4) 1935.

2. (*a*) Lyon, D. M., and Dunlop, D. M.: Mandelic Acid in the Treatment of Urinary Infections, Brit. M. J. **2**:1096 (Dec. 7) 1935. (*b*) Holling, H. E., and Platt, R.: Mandelic Acid and Ammonium Mandelate in the Treatment of Urinary Infections, Lancet **1**:769 (April 4) 1936. (*c*) Alexander, F. W.: Sodium Mandelate in Chronic Cystitis, ibid. **1**:391 (Feb. 15) 1936.

3. Fuller, A. T.: The Ketogenic Diet: Nature of the Bactericidal Agent, Lancet **1**:855 (April 22) 1933.

4. Helmholz, H. F.: Therapeutic Results with the Ketogenic Diet in the Treatment of Urinary Infections, J. A. M. A. **105**:778 (Sept. 7) 1935. (*b*) Rector, J. M., and Wheeler, W. E.: The Use of the Ketogenic Diet in Chronic Pyuria, New England J. Med. **211**:143 (July 26) 1934. (*c*) Cook, E. N., and Braasch, W. F.: Further Studies on the Use of the Ketogenic Diet in Bacilluria, J. Urol. **33**:583 (June) 1935. (*d*) Wilson, C. M.: Prognosis in Infections of the Urinary Tract by the Colon Bacillus, Lancet **2**:1297 (Dec. 8) 1934.

METHODS

In November, 1935, I began the treatment of patients having acute febrile and chronic urinary infection with sodium mandelate [5] and ammonium chloride. The children were studied from the standpoint of the function of the kidneys, as shown by tests to determine the concentration and dilution of the urine, the amount of phenolsulfonphthalein excreted and the amount of nonprotein nitrogen in the blood; and the anatomic situation was defined with the aid of intravenous or retrograde pyelography or both. Patients clearly requiring surgical treatment, such as those with obstructive hydronephrosis, and those with only mild and transitory evidence of infection (as judged by examinations and cultures of the urine) were not included in this study. In this paper are reported observations on five infants and eleven older children. The colon bacillus was the infecting organism in all patients. There was one patient from whom Bacillus Fothergilli [6] was cultured, together with the colon bacillus.

The plan of treatment used was as follows: The intake of fluids was limited to from 800 to 900 cc. per day to favor the concentration of mandelic acid in the urine. Ammonium chloride, in doses which totaled from 2 to 6 Gm. daily, was given to acidify the urine, and a solution of sodium mandelate, as prepared by Rosenheim,[1] was given in amounts equivalent to from 4 to 12 Gm. of mandelic acid per day. Recently Holling and Platt [2b] reported that they used ammonium mandelate in place of sodium mandelate and that with the former preparation the use of ammonium chloride is unnecessary. If further work substantiates their findings, ammonium mandelate would be the drug of choice. In my series of cases sodium mandelate and ammonium chloride were given alternately at intervals of from two to three hours, and usually four doses of each of the medicaments were given every twenty-four hours. For older children, the ammonium chloride was given in the form of pills coated with phenylsalicylate; the infants received concentrated solution of ammonium chloride in fruit juice or apple-sauce. The solution of sodium mandelate was given in an equal volume of fruit juice or water. During the course of treatment the urine was tested each morning to determine its degree of acidity, and the dosage of ammonium chloride was regulated according to the p_H, the objective being to keep the p_H below 5.5. This was determined by using chlorophenolsulfonphthalein or methyl red, either as a solution or to impregnate filter paper, which was then dried before using. Likewise the sediment was examined daily for the number of formed elements (leukocytes, erythrocytes, casts and epithelial cells), and cultures of the urine were made at varying intervals.

Although it was appreciated that normal urine or the urine of patients with untreated urinary infections is an excellent culture medium, bactericidal tests of the urine of most patients were made before treatment with mandelic acid was instituted. The technic employed was the same as that described in the next paragraph; the results, however, were markedly different from those recorded there, for in every instance after only five hours of incubation the urine of the untreated patients showed a tremendous increase in the number of organisms present.

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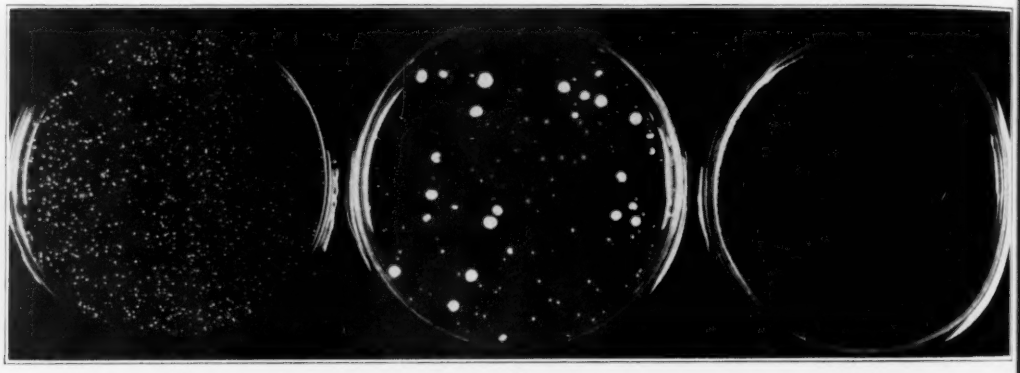
5. The mandelic acid was furnished by courtesy of the Mallinckrodt Chemical Works, St. Louis.

6. Fothergill, L. D.: Unusual Types of Non-Lactose-Fermenting, Gram-Negative Bacilli from Acute Diarrhea in Infants, J. Infect. Dis. **45**:393 (Nov.) 1929.

In most patients when, in from three to seven days, the urine became sterile its bactericidal power was tested by inoculating samples of it with varying numbers of colon bacilli or, in a small number of instances, other organisms. With a measured amount of the inoculated urine and 1 per cent of dextrose agar a pour plate was made immediately, and the urine was then incubated at 37 C. After five and twenty-four hour intervals additional pour plates were made; when each of the pour plates had been incubated for forty-eight hours the number of colonies present was counted. A ruled glass plate was used, and when the number of colonies was high the total was computed after counting the colonies on a fraction of the plate. Further studies of the types of organisms which are killed by mandelic acid are in progress. The single instance in which the effect of mandelic acid on the typhoid bacillus was tested affords insignificant evidence on which to presume the possibility of the application of mandelic acid in the treatment of acute and chronic typhoid cystitis and pyelonephritis, but it suggests a field for further investigation.



A B C

Bactericidal test of the urine of a patient under treatment with mandelic acid. Three pour plates are shown, as follows: *A*, made with 0.1 cc. of urine immediately after its inoculation with Bacillus coli. *B*, made with 0.1 cc. of the same urine after it had been incubated for five hours. *C*, made with 1 cc. of the same urine after it had been incubated for twenty-four hours. All pour plates were incubated for forty-eight hours. The rapid decrease in the numbers of colonies indicated the marked bactericidal power of the urine.

RESULTS

The photomicrograph here reproduced shows a series of pour plates, illustrating the effective bactericidal power of the urine of a patient under treatment with mandelic acid. The results in other cases are shown in table 1. The records of the preliminary bactericidal tests have been omitted because of their uniformly negative results.

Abstracted data for the patients treated are presented in table 2. The dose of sodium mandelate indicated in each instance is the maximal dose employed, for early in the study 4 Gm. doses were given unsuccessfully to several infants. Treatment of a few of the older children was

TABLE 1.—*Results of Bactericidal Tests*

Case No.	Organism Tested	Approximate Number of Organisms per Cubic Centimeter of Urine: Inoculated	After Five Hours	After Twenty-Four Hours	Comment
1	B. coli	40,000	1,500	0	Bactericidal
	Staph. aureus	140,000	15,000	0	Bactericidal
2	B. coli	60,000	3,000	0	Bactericidal
	B. dysenteriae Sonne	120,000	5,000	0	Bactericidal
3	B. coli	60,000	1,900	0	Bactericidal
	Staph. aureus	22,000	4,000	0	Bactericidal
4	B. coli	100,000	Innumerable	Innumerable	No effect
5	B. coli	1,000	.....	2,000	Bacteriostatic
6	No test				
7	B. coli	30,000	0	0	Bactericidal
8	B. coli	180,000	.....	3,000	Bacteriostatic
					Bactericidal (?)
	B. coli	80,000	2,000	0	Bactericidal
	B. typhosus	40,000	0	0	Bactericidal
9	B. coli	300,000	.....	0	Bactericidal
10	B. coli	30,000	0	0	Bactericidal
	B. pyocyaneus	200,000	0	0	Bactericidal
11	B. coli	50,000	.....	0	Bactericidal
12	B. coli	120,000	2,000	0	Bactericidal
13	B. coli	1,500	.....	120	Bacteriostatic
14	B. coli	60,000	.....	90,000	Bacteriostatic
	Staph. aureus	180,000	.....	36,000	Bacteriostatic
15*	B. coli	7,000,000	Innumerable	Innumerable	No effect
16*	B. coli	5,000,000	Innumerable	Innumerable	No effect

* The counts were made on uninoculated specimens obtained by catheterization. The results were similar in many instances to those of the preliminary bactericidal tests, but the tests reported in this table were made while the patients were under treatment and while the urine was not yet sterile.

TABLE 2.—*Abstract of Data for Patients Treated* *

Case No.	Age	Duration of Symptoms	Pyelographic Evidence	Dosage of Mandelic Acid, Gm. per Day	No. of Days After Starting Treatment That Urine Became Sterile	Urine Bactericidal	Result at End of Period Indicated
1	3 yr.	5 mo.	Normal	6	3	Yes	6 mo., cured
2	2½ yr.	2 wk.	No pyelogram	6	3	Yes	3 mo., improved
3	2½ yr.	3 wk.	Dilated	6	6	Yes	3 mo., improved
4	2 yr.	1 wk.	Normal	8	Not sterile	No	3 mo., treatment failed
5†	1 yr.	6 wk. (?)	Normal	6	12	....	1 mo., improved
6	7 yr.	3 mo. (?)	Blunt calices	6	5	No test	4½ mo., improved
7	10 yr.	2 wk.	No pyelogram	8	9	Yes	3 mo., improved
8	10 yr.	4½ yr.	Double ureter	8	4	....	1½ mo., recurred
				12	5	Yes	1 mo., improved
9	12 yr.	6 days	Normal	8	5	Yes	3 mo., improved
10	11 yr.	3 yr.	Abnormal	12	6	Yes	Improved
11	11 yr.	3 yr. (?)	Infantile kidney	12	9	Yes	1 mo., recurred
12	10 yr.	6 yr.	Marked dilation	12	7	Yes	Relapse
13	4 mo.	2 mo.	Hydronephrosis	8	15	....	3 mo., relapse
14	22 mo.	2 mo.	Slight dilation	12	6	Yes	1 mo., improved
15	2½ yr.	(?)	Normal	12	Not sterile	No	Treatment failed
16	6 mo.	2 mo.	Slight dilation	8	15	No	Relapse

* Bacillus coli was found to be the infecting organism in all patients.
† In addition to B. coli, Bacillus Fothergilli was noted.

started with doses smaller than those recorded. Several cases warrant comments not included in the table.

CASE 4.—The child was treated with sodium mandelate for fifteen days without effect; about two weeks after treatment had been suspended the urine cleared spontaneously. At that time I felt some hesitancy about employing larger doses of mandelic acid, but now I would use them in any similar case.

CASE 5.—Hyaline and granular casts and red blood cells appeared in the child's urine the day after treatment was started. Treatment was stopped for twelve days and then reinstituted, and after another twelve days a culture showed that the urine had become sterile. Occasional casts and red blood cells were found in the urine throughout the period of treatment, but no more appeared after medication was stopped. It is obvious that there is no way of knowing whether the casts and the red blood cells in the urine were due to infection or to the treatment.

CASE 7.—The pyuria appeared during an attack of typhoid fever, but only colon bacilli were cultured from the urine.

CASE 10.—Pyelograms showed that the upper pole of the right kidney was contracted. After nine days of treatment occasional granular and hyaline casts appeared in the urine; these disappeared within two days after the omission of sodium mandelate, although the administration of ammonium chloride and the restriction of fluids were continued.

CASE 11.—Recurrence of pyuria without symptoms was observed when the child returned for urinary examination two weeks after discharge.

CASE 12.—The child had been treated unsuccessfully with methenamine and ketogenic diets during previous stays in the hospital; however, she had enjoyed fairly frequent spontaneous remissions. In the present instance treatment was stopped, of necessity, two days after the urine had become sterile. Four days later fever and abdominal pain developed, and there was a recurrence of the bacilluria and pyuria. The patient is still under observation.

CASE 13.—Great difficulty was encountered in maintaining the p_H of the urine at the desired level. After the urine became sterile the p_H rose gradually to 5.8 and 6, and within a week cultures of the urine again showed bacilli. A carefully controlled ketogenic diet was instituted but proved ineffective, for even when large doses of ammonium chloride were given the p_H of the urine was seldom below 6. The child was taken from the hospital and on subsequent visits to the outpatient department has shown no change in the urine.

CASE 15.—The child had not enjoyed normal health for more than a year, and, although there were no urinary symptoms, examination of the urine and tests of the urinary concentration and the urea clearance revealed infection with colon bacilli and moderate impairment of renal function. In this patient also difficulty in maintaining a low urinary p_H was met. Even during a brief period when the p_H was below 5.5 the urine was not bactericidal, and it was presumed that the mandelic acid was not present in adequate concentration. Casts appeared in the urine for the first time fifteen days after treatment was started and disappeared three days after the sodium mandelate was omitted.

CASE 16.—The child was mentally deficient. She had a temperature as high as 104 F. for more than three weeks at the onset of the illness and had been sick for two months before treatment with sodium mandelate was started. The p_H of the urine varied markedly and was seldom reduced to or below 5.5. Nine days after the

institution of the treatment rare hyaline casts appeared in the urine, and thereafter reappeared at irregular intervals until treatment was stopped. After fifteen days of treatment, colon bacilli were absent from the urine, but, although medication was continued, six days later cultures showed enterococci and Bacillus Morgani 1. After treatment had been continued for a reasonable length of time without benefit, it was stopped. One and one-half weeks later the urine cleared spontaneously. The child was taken home and unfortunately cannot be located for checking up.

COMMENT

In addition to making a therapeutic trial of the recommended doses of sodium mandelate and to noting the bactericidal power of the urine of patients under treatment, I was interested in making observations on two further points:

1. The feasibility of using smaller doses of the drug in infants
2. The possible deleterious effects of the drug when used in relatively large doses in infants and children

Several of the smaller children and infants were given one fourth, one half and three fourths of the doses for adults, but, except in five cases in which the larger fractional doses were used, the urine had no bactericidal effect, and the full doses for adults were later substituted. Because the infants received the same amount of fluids as is allowed adults and because, the p_H remaining constant, the effectiveness of the drug is dependent on its concentration in the urine, I was not surprised by my failure to induce the production of bactericidal urine by the giving of much reduced doses.

If, however, infants weighing from 3 to 5 Kg. are to be given the same doses of a drug as would be given to an adult weighing from four to twenty times as much, the possible toxic effects must be considered carefully. Two infants (40 per cent of the total of five) and two older children (18 per cent of the total of eleven) showed casts and sometimes red blood cells in the urine. The sudden appearance of these formed elements after from three to twenty days of medication and their rapid disappearance when the treatment was stopped would indicate that sodium mandelate or its acid ion is in some patients a renal irritant. Although methenamine may produce hematuria and albuminuria when it is given in adequate doses, such findings are usually evidence of cystitis.[7] The appearance of casts in the urine of some of the patients in this study must be viewed with more concern than are symptoms of cystitis, for the appearance of such elements seems indicative of renal rather than vesical reaction. That the irritant action of sodium mandelate is markedly

7. Helmholz, H. F.: Experimental Studies in Urinary Infections of the Bacillary Type, J. Urol. **31**:173 (Feb.) 1934.

irregular is suggested by the fact that one infant (not included in this series), weighing 4 Kg., was kept on one and one-half times the dosage for adults for three weeks without showing any evidence of renal irritation or any significant alteration in the chemistry of his blood.

The small series of cases here presented cannot be discussed from the standpoint of clinical cure. Acute urinary infections as a rule are self-limited; certainly chronic pyuria of two or more months' duration should not be pronounced cured until at least six months' observation has shown no evidence of recurrence of infection. It seems significant, however, that, with the treatment outlined, the urine of all patients with acute pyuria (except one) and of four with a chronic urinary infection became sterile and strongly bactericidal. In a few patients with chronic infection or with evidence of functional renal damage consistently high acidity of the urine could not be achieved; in a few other patients, in spite of the reduction of the p_H to the desired level, sterilization of the urine could not be maintained. Relapses (after they had had a few days with sterile urine) were noted in three patients with histories of protracted infection and with pyelographic evidence of anatomic changes in the pelves or ureters of the kidneys. In two of these cases treatment was obviously stopped too soon. The interruption of treatment was necessitated by a temporary shortage of the drug, and investigators using other forms of treatment have reported that they encountered similar difficulties.[4d] For patients with chronic infections a longer course of treatment should be given than is necessary for those with infections of shorter duration. If the treatment of patients with a chronic disease is continued for from seven to ten days after the urine becomes sterile, better results will be achieved than when treatment is discontinued sooner.

SUMMARY

Acute and chronic urinary infections in a series of sixteen infants and children were treated with sodium mandelate and ammonium chloride.

In eleven (68 per cent) of the patients the urine became sterile in from three to ten days after institution of the treatment and remained sterile during the rest of the patient's stay in the hospital. Temporary sterility of the urine was observed in three additional patients.

In favorable instances the urine was strongly bactericidal; some organisms other than Bacillus coli-communior and Bacillus coli-communis are killed by urine containing mandelic acid.

In four (25 per cent) of the patients evidence of renal irritation appeared after institution of the treatment and disappeared when sodium mandelate was omitted.

Further studies are warranted [8] in carefully controlled cases, and the trial of ammonium mandelate in place of sodium mandelate would seem to be indicated.

Beverly Hills Professional Building.

8. Since the completion of my study, H. F. Helmholz has reported on the use of mandelic acid in urinary infections in children (Successful Treatment by Means of Mandelic Acid of Child with Urinary Stasis and Infection, Proc. Staff Meet., Mayo Clin. **11**:231 [April 8] 1936). Other reports since that time include: Helmholz, H. F., and Osterberg, A. E.: Rate of Excretion and Bactericidal Power of Mandelic Acid in the Urine, J. A. M. A. **107**:1794 (Nov. 28) 1936. Carroll, B.; Lewis, B., and Kapel, L.: Mandelic Acid as a Urinary Antiseptic, ibid. **107**:1796 (Nov. 28) 1936. Dolan, L. P.: Mandelic Acid in the Treatment of Infections of the Urinary Tract, ibid. **107**:1800 (Nov. 28) 1936.

PROPHYLACTIC AND THERAPEUTIC USE OF SCARLET FEVER CONVALESCENT SERUM

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Scarlet fever is essentially a disease of children, but their susceptibility to it is much lower than their susceptibility to measles. According to reports, susceptibility to scarlet fever varies from 19 to 100 per cent, depending on the age group and the class to which the patient belongs. It is higher in the well-to-do classes, and it decreases with increasing age, as do the morbidity and the mortality. Zingher [1] made cutaneous tests on 300 children in a private school in New York and found that 83 per cent of the children under 18 years of age reacted to scarlet fever toxin. Johannessen [2] reported that of 185 children under 15 who were exposed to scarlet fever, 28 per cent contracted it, while of 314 exposed adults, only 5 per cent had the disease. At least half the cases occur in children between 3 and 8 years old, and 90 per cent occur in those under 15. The mortality is highest during the first year of life, being approximately 33 per cent at that time, and it drops by the eighth year to between 3 and 5 per cent, at which point it remains thereafter.

Statistics from Providence, R. I., show that during the past forty or fifty years the mortality has dropped from 40 to 2 per hundred thousand, a decline which according to Pope is characteristic in most American cities.[3] The case fatality rate ranges from about 1 death for each 100 reported cases to perhaps 3 or 4 deaths for each 100 cases in hospitals. Although there has been a marked reduction in the death rate, records show that the morbidity has remained about the same or has decreased slightly. Scarlet fever still carries with it a high incidence of complications which prolong disability, retard convalescence and too often lead to death.

From the Convalescent Serum Center of the Children's Hospital.

1. Zingher, A., in discussion on Dick, G. F., and Dick, G. H.: Prevention of Scarlet Fever, J. A. M. A. **83**:84 (July 12) 1924.

2. Johannessen, A.: Die epidemische Verbreitung des Scharlachfiebers im Norwegen, Christiania, J. Dybwad, 1884.

3. Toomey, J. A.: Treatment and Prevention of Scarlet Fever by Specific Antitoxins and Serums, J. A. M. A. **91**:1599 (Nov. 24) 1928.

Much work has been done in recent years on methods for the prevention and the treatment of the disease. These methods include the use of toxin to induce active immunity and the employment of antitoxic and convalescent serums both as prophylactic and as therapeutic agents.

The Dicks [4] (1924) observed that scarlet fever is caused by a hemolytic streptococcus and that it produces a soluble toxin which is absorbed into the blood and causes nausea, vomiting and the characteristic rash. This observation led them to the development of a cutaneous test for susceptibility, a method of preventive immunization and the production of an antitoxin.

The cutaneous test is made by the injection of diluted toxin intracutaneously. Of the persons tested who had no history of scarlet fever, 41.6 per cent gave positive reactions, whereas the convalescents tested gave negative or only slightly positive reactions.

The Dicks advocated active immunization of persons who showed positive cutaneous reactions and who had not been exposed to scarlet fever. When small amounts of toxin were injected into susceptible persons, malaise, nausea, vomiting, fever and a rash sometimes developed; but after these reactions the cutaneous test gave negative or only slightly positive reactions. These severe reactions in the immunization of susceptible persons were avoided by using a small initial dose of toxin and increasing successive doses gradually. Immunization was carried to the point of a negative reaction to the cutaneous test. When the subject had been exposed to the disease, the method of prevention varied according to the clinical findings. Both cutaneous tests and cultures of material from the throat were made at the same time. If the reaction to the cutaneous test was negative, immunization was considered unnecessary. If the reaction to the cutaneous test was positive and the culture was negative for hemolytic streptococci, active immunization was carried out with three doses of toxin. Persons who had both a positive reaction to the cutaneous test and a positive culture were passively immunized by the injection of convalescent serum. This method of immunization has been received with enthusiasm by some physicians and with reservations by others. Toomey stated that by means of the routine procedure as outlined scarlet fever had been practically eradicated in the resident population of the City Hospital of Cleveland. On the other hand, Holt and McIntosh [4a] stated that, at some stage in

4. Dick, G. F., and Dick, G. H.: Prevention of Scarlet Fever, J. A. M. A. **83**:84 (July 12) 1924; Therapeutic Results with Concentrated Scarlet Fever Antitoxin, ibid. **85**:1693 (Nov. 28) 1925.

4a. Holt, L. Emmett, Jr., and McIntosh, Rustin: Holt's Diseases of Infancy and Childhood, ed. 10, New York, D. Appleton-Century Company, 1933.

the course of injections during active immunization, reactions occur in about 10 per cent of the subjects and that the value of the method was still an open question.

The Dicks' specific streptococcus antitoxic serum was produced by immunizing horses with gradually increasing doses of toxin. The experiment was not the first of its kind, since Moser,[5] as early as 1902, developed an antiserum by the immunization of horses to hemolytic streptococci which had been isolated from patients with scarlet fever. Moser's serum was also used therapeutically, but it fell into disfavor because of its low potency and the severe serum disease which followed its use. The Dicks stated that the therapeutic value of their serum could be determined only by the results obtained in a large series of carefully controlled cases. Many observers have since opposed the general use of antitoxin prophylactically because of the severity of the serum disease which often follows. In series of cases reported by several investigators, serum reactions occurred in from 15 to 42 per cent of the treated patients. Using refined serum, Park[6] observed reactions in 30 per cent of his cases. Gordon and his co-workers[7] observed reactions in 33 per cent, Lucchesi and Bowman[8] in 36.3 per cent and Toomey and Dolch[8a] in 38.5 per cent. Toomey stated that more illness resulted from the use of the antitoxin than from scarlet fever.

Divergent opinions are held also regarding the therapeutic benefits derived from antitoxin. Toomey[3] (1928), with a series of 283 patients treated with antitoxin and 60 control patients, noted no convincing difference between the intramuscularly treated patients and the untreated patients. Of 54 patients who received intravenous treatment, the first 14 showed marked improvement, whereas the remaining 40 did not appear to have benefited from the treatment and 3 of the 40 died in a fashion suggestive of anaphylaxis. Toomey stated that serum sickness has been extremely severe, which fact is ignored by many authors, and he expressed the belief that the evidence in favor of scarlet fever antitoxin is neither clearcut nor decisive.

Gabriel[9] (1930) reported 401 cases, in none of which treatment with serum altered the course of the disease. He concluded that the

5. Moser, P.: Ueber die Behandlung des Scharlachs mit einem Scharlach-Streptokokkenserum, Wien. klin. Wchnschr. **15**:1053, 1902.

6. Park, W. H.: Scarlet Fever: Etiology, Prevention by Immunization, and Antitoxic Treatment, J. A. M. A. **85**:1180 (Oct. 17) 1925.

7. Gordon, J. E.; Bernbaum, B. B., and Sheffield, L. C.: Convalescent and Antitoxic Serums in Scarlet Fever, J. A. M. A. **90**:1604 (May 19) 1928.

8. Lucchesi, P. F., and Bowman, J. E.: Antitoxin Versus No Antitoxin in Scarlet Fever, J. A. M. A. **103**:1049 (Oct. 6) 1934.

8a. Toomey, J. A., and Dolch, E. G., cited by Toomey.[3]

9. Gabriel, Ernest, quoted in Abt., I. A., and Abt, A. F.: Pediatrics, Practical Medicine Series, Chicago, Year Book Publishers, Inc., 1931, p. 166.

Vienna Moser-Dick and Marburger Dick-Dochez serums have no influence on the course of scarlet fever.

On the other hand, Gordon [10] (1927) reported a favorable effect on the clinical course of the disease, a decrease in complications and a reduction in the number of hemolytic streptococci in the noses and throats of convalescent patients following the administration of antitoxin. Complications developed in 34 per cent of 317 treated patients and in 56 per cent of 367 control patients. No control patient with severe scarlet fever was free from complications, whereas 35 per cent of the treated patients escaped complications. In serum-treated patients cervical adenitis cleared up in a third less time than in control patients and suppurative otitis media in less than half the time.

Lucchesi and Bowman [8] (1934), after studying 5,377 patients, of whom 3,045 received antitoxin and 2,332 did not, noted a shortened duration of the disease and a decrease in the incidence of complications in the serum-treated patients. The latter effect was most pronounced in the patients with severe involvement. These authors expressed the belief that antitoxin is indicated in cases of moderate or severe scarlet fever.

Rhoads and Gasul [11] (1934), in controlling outbreaks of scarlet fever in institutions and in homes during eight years, used antitoxin repeatedly but only when the Dick test and the cultures of material from the throat gave positive results and when clinical signs, such as fever or inflammation of the throat, indicated that scarlet fever was imminent. In the experience of these investigators antitoxin always prevented the development of scarlet fever.

Gordon and his co-workers [7] (1928), in a report on a series of cases, compared the results obtained by the use of antitoxic serum with those gained when convalescent serum was used. They stated that on the basis of the case fatality rate and the percentage incidence of complications there is no essential difference between the patients with severe scarlet fever treated with scarlet fever streptococcus antitoxin and those treated with convalescent serum but that the absence of serum reactions makes convalescent serum therapy more desirable.

Scarlet fever convalescent serum has been widely used since its introduction by Weissbecker [12] in 1897. At first the results were not striking, because of the use of too little serum and the employment of the less effective, subcutaneous route for its injection, so that it

10. Gordon, J. E.: Treatment of Scarlet Fever with Streptococcus Antitoxin. J. A. M. A. **88**:382 (Feb. 5) 1927.

11. Rhoads, P. S., and Gasul, B. M.: Convalescent Scarlet Fever Serum and Commercial Antitoxin: A Comparison of Their Protective Values, J. A. M. A. **102**:2005 (June 16) 1934.

12. Weissbecker, Leopold: Ztschr. f. klin. Med. **32**:188. 1897

fell into disuse. It was revived, however, by Reiss and Jungmann [13] in 1912 and has since become established as a valuable prophylactic and therapeutic substance.

Degkwitz [14] (1922) passively immunized 509 exposed persons with convalescent serum, using 5 or 6 cc. doses for children under 8 years of age and 10 cc. for those from 9 to 14. Only 3 contracted the disease.

The Dicks, as mentioned previously, passively immunized with convalescent serum exposed persons who showed positive reactions to the cutaneous test and a positive culture of material from the throat. Many of these had fever and sore throat at the time of the injection, but scarlet fever developed in none.

Meader [15] (1930) gave 7.5 cc. doses of convalescent serum to 450 exposed persons, and only 2.9 per cent contracted scarlet fever; whereas in a group of 321 exposed control subjects who did not receive serum, 12.8 per cent contracted scarlet fever. From this fact he estimated a protection of about 85 per cent.

Hoyne, Levinson and Thalhimer [16] (1935) received reports from private physicians on 862 persons exposed at home who were given prophylactic inoculations. Doses of 10 cc. were used for children under 10 years and 20 cc. for older children. Scarlet fever developed in 24 persons, or in 2.8 per cent. Of 83 hospital children with a positive reaction to the Dick test who were exposed in the wards to persons with active scarlet fever and who received serum, 4 (5 per cent) came down with the disease after a prolonged period of incubation. In all 4 the disease was mild and atypical.

The beneficial effect of convalescent serum on the general condition of patients with scarlet fever with regard to the toxemia, fever and rash is generally agreed on. Evidence is accumulating which reveals that patients treated with serum also show a lower incidence of complications, alleviation of complications in some instances in which they already exist and possibly a lower mortality.

Kling and Widfelt [17] (1918) reported that of a group of 237 patients who received convalescent serum 17.7 per cent died but that in a corre-

13. Reiss, E., and Jungmann, P.: Die Behandlung schwerer Scharlachfälle mit Rekonvalescentenserum, Deutsches Arch. f. klin. Med. **106**:70, 1912.

14. Degkwitz, R.: Causative Agent in Scarlet Fever, München. med. Wchnschr. **69**:955 (June 30) 1922.

15. Meader, F. M.: Scarlet Fever Prophylaxis: Use of Blood Serum from Persons Who Have Recovered from Scarlet Fever, J. A. M. A. **94**:622 (March 1) 1930.

16. Hoyne, A. L.; Levinson, S. O., and Thalhimer, W.: Convalescent Scarlet Fever Serum: Its Prophylactic and Therapeutic Value, J. A. M. A. **105**:783 (Sept. 7) 1935.

17. Kling, C., and Widfelt, G.: Serotherapy of Scarlet Fever, Hygiea **80**:2 (Jan. 16) 1918.

sponding group who received no serum the mortality was 70 per cent. They expressed the belief that serum greatly benefited patients with severe toxic scarlet fever.

Weaver[18] (1921) used convalescent serum in 54 cases of scarlet fever which represented the most severe toxic attacks in approximately 1,200 patients. In 38 the disease was of the toxic type; in 6 there were septic complications, and in 10, toxic symptoms and septic complications were combined. Only 2 of the patients died, 1 on the day of admission and the other four days later. One of these had a toxic condition and the other a septic condition.

Prinzing[19] (1918) compared 97 serum-treated and 257 untreated patients and reported that the incidence of complications, such as lymphadenitis, otitis media and glomerulonephritis, had been reduced more than 50 per cent by treatment with serum.

Hoyne, Levinson and Thalhimer[16] (1935) reported the results on a large series of serum-treated patients, which included observations on 947 patients admitted to the hospital and information on 983 patients treated at home by private physicians. Their control group comprised 6,282 patients not treated with serum who were only mildly or moderately ill. Of the serum-treated patients, the hospital group was classed as severely ill and the home group occupied, in relation to the degree of severity, a position midway between the hospital and the control group. Of 446 hospital patients who were critically ill but free from complications at the time the serum was administered, only 24 per cent had complications, as compared with 58.4 per cent of the 6,282 mildly and moderately ill control group. All types of complications were much fewer in the home group than in the other two groups. The frequency of hemorrhagic nephritis was 0.2 per cent for the home group and 0.6 per cent for the hospital group, as against 3.6 per cent for the control group. With patients who had complications on admission to the hospital, it was observed that progression did not usually take place after the administration of serum. Worth noting is the fatality rate of 773 private patients treated with serum in the first three days. This was approximately one-third the fatality rate of scarlet fever throughout the city at the same time.

All observers stress the importance of the early administration of serum. However, serum should not be withheld in advanced or complicated attacks, as in such instances it frequently seems to be beneficial.

18. Weaver, G. H.: Further Observations on Treatment of Scarlet Fever with Immune Human Serum, J. A. M. A. **77**:1420 (Oct. 29) 1921.

19. Prinzing, F.: Bemerkungen über Komplikationen und Nachkrankheiten des Scharlachs bei Serotherapie, Therap. Monatsh. **32**:16, 1918.

Under these circumstances Hoyne and his colleagues supplemented the administration of convalescent serum with immunotransfusions with "increasingly better results."

METHOD

Blood for the preparation of scarlet fever convalescent serum is drawn from fasting donors from the twenty-first day of the attack to the end of the third month of convalescence.

This paper deals with the analysis of cases in which the patients were exposed to scarlet fever at home, including both patients who received convalescent serum prophylactically and patients to whom it was administered therapeutically.

PROPHYLAXIS

Doses of 10 cc. of serum are recommended for children less than 10 years of age and 20 cc. for children over 10.

TABLE 1.—*Results of Prophylaxis Against Scarlet Fever in Patients Exposed at Home*

Age, Yr.	Exposed Persons	No. Who Had Mild Scarlet Fever	No. Who Had Moderate Scarlet Fever	Percentage Who Escaped Scarlet Fever	Percentage Who Had Modified Scarlet Fever	No. Who Had Complications
½- 5.....	44	2*		95.40	4.50	0
5-10.....	30		1‡	96.60		0
Over 10.....	22	1†		95.40	4.50	0
Not stated.....	6			100.00		
Total.....	102	3	1	96.08	2.94	None

* Scarlet fever developed six days after the administration of serum.
† Sore throat and fever—no rash—developed eight days after the administration of serum.
‡ Scarlet fever developed four days after the administration of serum.

The results obtained in 102 exposed persons who received convalescent serum for prevention of the disease are shown in table 1. Scarlet fever developed in 4 of them. Three of these had mild attacks which resembled those referred to by Hoyne, Levinson and Thalhimer[16] as being analogous to serum-attenuated measles, which so often occurs after the prophylactic administration of measles convalescent serum. This group, members of a single family, consisted of 2 sisters, aged 3 and 5 years, and the mother. All were exposed to a third child in the family, who was ill with scarlet fever and who had received no serum. Each of the 3 exposed persons was given 10 cc. of scarlet fever convalescent serum on the second day of exposure. Six days later the 2 small girls contracted mild sore throat, low grade fever and a rash which was not followed by peeling. Neither was nearly so sick as the child who received no serum. Eight days after receiving serum the mother had a sore throat, with malaise and a temperature of 99 F. but no rash. Although she failed to exhibit a rash, in view of the history

of exposure her symptoms were justly ascribed to the scarlet fever streptococcus and the absence of the rash to the possible effect of the serum.

In the fourth case of scarlet fever the disease was of moderate severity and occurred in a 10 year old girl having close contact with her mother, who was severely ill from the disease. The child was given 20 cc. of serum on the fifth day of exposure; fever appeared on the ninth day and was followed by a scarlatinal rash on the thirteenth day. The injection of serum was not repeated; however, the course of the disease was no doubt favorably influenced by the single injection, since she recovered without delay or complications after undergoing intensive exposure to a person with a virulent infection.

All four patients remained in continuous contact with patients having scarlet fever and should therefore have been given repeated or larger doses of serum in order that optimum results might have been obtained.

TABLE 2.—*Incubation Period in the 4 Persons of the 102 Exposed at Home in Whom Scarlet Fever Developed*

Age, Yr.	Day After Exposure on Which Serum Was Given	Dose, Cc.	Incubation Period, Days	Character of Disease	Complications
3	Second	10	8 days	Mild	None
5	Second	10	8 days	Mild	None
10	Fifth	20	9 days	Moderate	None
Adult	Second	10	10 days	Mild; no rash	None

It is interesting to note that in each instance the period of incubation was prolonged (table 2). This finding is in accord with the experience of Hoyne, Levinson and Thalhimer [16] with 4 cases of scarlet fever which developed in 83 inoculated persons who had a positive reaction to the Dick test and who had been exposed to scarlet fever.

THERAPY

The dose of serum recommended for the treatment of scarlet fever is as follows:

	Dose in Moderate Attacks, Cc.	Dose in Severe Attacks, Cc.
Infants	20	20– 40
Children	20–40	60
Adults	40–60	80–100

Forty-seven patients with scarlet fever were given convalescent serum. The results are indicated in table 3. All but 1 patient were reported as

showing improvement in the general condition after the injection of serum. The favorable effect was manifested by a decrease in toxicity, by a lowering of the temperature and in some instances by the halting or disappearance of the rash. In 6 patients the results of the injection of the serum were striking in that improvement occurred almost immediately; in the remaining 40 patients the effect was less spectacular but definite, improvement occurring after from twelve to twenty-four hours.

TABLE 3.—*Results Obtained with Convalescent Serum According to Age Groups*

Age, Yr.	No. of Patients	Character of Disease			Improvement		No Effect	Patients Showing Complications	Percentage Benefited
		Mild	Moderate	Severe	Striking	Noticeable			
½- 5	7		5	2		6	1	3	85.7
5-10	28	8	18	2	6	22		6	100.0
Over 10	11	1	6	4		11		3	100.0
Unknown	1			1		1		1	100.0
Total	47	9	29	9	6	40	1	13	97.8

TABLE 4.—*Results Obtained with Convalescent Serum According to Age of Patient and Amount of Serum Given*

Dose of Serum Intramuscularly, Cc.	½-5 Years			5-10 Years			Over 10 Years			Age Not Stated		
	No. of Patients	Improved by Serum	Complications	No. of Patients	Improved by Serum	Complications	No. of Patients	Improved by Serum	Complications	No. of Patients	Improved by Serum	Complications
10	..	..	..	1	1	0	..	..	..	..	..	..
20	5	4	2	20	20	5	7	7	0	..	..	..
25	..	..	..	1	1	0	..	..	..	..	..	..
30	..	..	..	1	1	0	..	..	..	..	..	..
40	1	1	0	5	5	1	3	3	2	1	1	1
60	1	1	1	..	..	..	..	..	..	..	..	..
80	..	..	..	..	..	..	1	1	1	..	..	..
Total	7	6	3	28	28	6	11	11	3	1	1	1

Failure of the 1 patient to show improvement may be explained on the basis that an insufficient quantity of serum was given. This child was 5 years of age and had a severe form of the disease followed by suppurative otitis media. He was given one 20 cc. dose of serum intramuscularly, whereas he should have received at least 60 cc. The same mistake, that of giving too little serum, has been made in treating a large number of patients with scarlet fever. This is obvious when table 3 is compared with table 4. To exemplify this mistake, one may consider the children from 5 to 10 years old. There were 28 patients in this group; 8 had mild, 18 moderate and 2 severe scarlet fever. Only

7 received a dose of serum larger than 20 cc. For therapeutic purposes it is advisable to use the maximal rather than the minimal doses of serum.

All these patients were given serum by the intramuscular route. Hoyne, Levinson and Thalhimer[16] found the favorable outcome of serum therapy still more impressive when the intravenous route was used.

Four patients exhibited complications before the administration of serum. Three had cervical adenitis, but in none did it progress after

TABLE 5.—*Results Obtained with Convalescent Serum; the Incidence of Complications and Their Relation to the Day of Illness on which the Serum was Given.*

Day of Disease on Which Serum Was Given	No. of Patients	Character of Disease			Improvement		No Effect	Patients Showing Complications	Nature of Complications	Percentage Showing Complications
		Mild	Moderate	Severe	Striking	Noticeable				
First	17	6	8	3	2	14	1	3	Catarrhal otitis media Otitis media and persistent fever Cervical adenitis	17.6
Second	15	1	13	1	3	12	..	3	Peritonsillar abscess and otitis media Cervical adenitis 1 week later Cervical adenitis	20.0
Third	3	1	2	..	..	3	..	1	Otitis media	33.3
Fourth	5	1	4	..	1	4	..	3	Cervical adenitis and otitis media, 11th day Mild cervical adenitis Otitis media 2 days after administration of serum	60.0
Fifth	1	..	..	1	..	1	..	..		.....
Tenth	1	..	..	1	..	1	..	1	Cervical abscess later	100.0
Unknown	5	..	2	3	..	5	..	2	Otitis media for 1 week Otitis media for 1 week	40.0
Total	47	9	29	9	6	40	1	13		27.6

they received the serum. The fourth had rhinitis and an acutely inflamed ear drum, which subsequently perforated and drained.

The incidence of complications occurring after serum therapy in relation to the day of illness on which the serum was first administered is given in table 5. This table shows that with every day's delay in the giving of serum the percentage incidence of complications increased, changing from 17.6 per cent the first day to 60 per cent by the fourth day. Of a total of 47 patients, 13, or 27.6 per cent, suffered from various complications, the majority of them from otitis media and cervical adenitis. The complications listed in table 5 reappear in table 6 with their individual percentage incidences.

Catarrhal otitis media, a mild complication, occurred in 1 patient. Suppurative otitis media showed the greatest frequency, occurring in

7 patients. One of these did not receive serum until the third day of illness and already had an inflamed tympanic membrane, which was apparently well on the way toward suppuration. Cervical adenitis developed in 5 patients, 2 of whom did not receive serum until the fourth day of illness. Peritonsillar abscess occurred in 1 patient and cervical abscess in another. The patient with the cervical abscess was not given serum until the tenth day of illness, at which time the probability that complications will develop is great. Attention has already been called to the tendency of physicians to use too little serum in their treatment of patients. Many of the patients showing complications did not receive the maximal doses. Nevertheless, some of the physicians said they believed the complications were much more benign and their duration shorter than would have been the case had serum not been given. The

TABLE 6.—*Incidence of Complications Occurring After the Administration of Serum*

Day of Illness on Which Serum Was Given	No. of Patients	Without Complications	Catarrhal Otitis Media	Suppurative Otitis Media	Cervical Adenitis	Peritonsillar Abscess	Cervical Abscess
First	17	14	1	1	1	..	..
Second	15	12	..	1	2	1	..
Third	3	2	..	1*	..	..	..
Fourth	5	2	..	2	2	..	..
Fifth	1	1	..	..	..	..	..
Tenth	1	..	..	..	..	..	1
Unknown	5	3	..	2	..	..	..
Total	47	34	1	7	5	1	1
Percentage	100	72.3	2.1	14.8	10.6	2.1	2.1

* The membrana tympani was inflamed at the time the serum was given.

incidence of complications also was undoubtedly lowered by the use of serum.

One has only to refer to authors who have been able to observe the results both in patients treated with serum and in patients not treated with serum to realize how high the incidence of complications is in patients not receiving serum. In a comparison of 97 patients treated with serum and 257 who were not given serum, Prinzing reported the following results:

	Without Serum, Percentage	With Serum, Percentage
Lymphadenitis	38.5	15.5
Otitis media	19.8	9.3
Glomerulonephritis	19.1	8.2

Hoyne, Levinson and Thalhimer [16] compared the incidence of complications in 446 hospital patients who were severely ill but free from

complications when the serum was administered with that in 6,282 patients not treated with serum who were only mildly or moderately ill. Their interesting results were as follows:

	Without Serum, Percentage	With Serum, Percentage
Cervical adenitis	27.0	11.0
Suppurative otitis media	13.6	5.0
Rhinitis	8.7	4.0
Arthritis	2.6	3.0
Mastoiditis	2.9	0.5
Nephritis	3.6	0.6
Total	58.4	24.1

It is notable that the incidence of complications in the serum-treated group was only 24 per cent, as compared with 58 per cent in the group not treated with serum.

Conservatively speaking, one may say that the incidence of complications is reduced one half by treatment with serum. The lowered incidence of nephritis is particularly noteworthy, since this is a dreaded complication.

OTHER STREPTOCOCCIC INFECTIONS

Thalhimer and Levinson [20] (1935) reported the results obtained by the use of scarlet fever convalescent serum in 122 patients suffering from severe diverse streptococcic infections, many of which were fulminating and had a grave prognosis. Large doses of serum were found necessary because of the virulence of the infections. The conditions treated included cervical adenitis following a streptococcic sore throat, acute streptococcic pharyngitis, purulent otitis media, streptococcic meningitis, streptococcic phlegmon, streptococcic tracheobronchitis, streptococcic pneumonia, acute vegetative endocarditis, streptococcic arthritis, sepsis with possible streptococcic peritonitis in patients with chronic nephritis, acute nephritis or cervical adenitis as a complication of streptococcic sore throat, streptococcic lymphadenitis, streptococcic peritonitis and streptococcic osteomyelitis.

The effect of treatment was considered excellent in 11 per cent of the patients and good in 44 per cent. Thus there was a total of 55 per cent in whom definite improvement and recovery occurred. The mortality rate for the entire group was only 19 per cent. All the patients with streptococcic meningitis, of whom there were 7, and those with streptococcic endocarditis, of whom there were 3, died. Nevertheless,

20. Thalhimer, W., and Levinson, S. O.: Pooled Convalescent Scarlet Fever Serum Treatment of Diverse Streptococcic Infections, J. A. M. A. **105**:864 (Sept. 14) 1935.

Thalhimer and Levinson expressed the belief that patients in the early stages of either of these two conditions should not be denied treatment with large amounts of convalescent serum, since an occasional patient may be helped. They called attention to the fact that in evaluating the treatment of diverse progressive hemolytic streptococcic infections with pooled convalescent serum, adequate consideration must be given to the type of disease with which one is dealing.

Among our patients who received convalescent serum was a group analogous to that on which Thalhimer and Levinson reported but much smaller. Of our 22 patients, 8 died (table 7). The deaths all occurred among patients who had violent and fulminating streptococcic infections, which do not as a rule yield to any form of treatment. Most of them were already moribund when serum was administered, as a last resort.

TABLE 7.—*Analysis of Deaths Due to Diverse Streptococcic Infections*

Serum Given Intramuscularly, Cc.	Condition Present When Serum Was Administered	Course	Time of Death
100*	Septicemia and endocarditis	Progressive	3 days later
20	Mastoiditis and meningitis following scarlet fever	Progressive	Unknown
100	Septicemia, sinus thrombosis and meningitis (illness of 25 days' duration)	Progressive	Unknown
20	Streptococcic pneumonia following measles	Progressive	Unknown
40†	Hemolytic streptococcic septicemia, abscess of the psoas, peritonitis and septic arthritis (of 6 days' duration)	Progressive	Within 36 hours
80	Septicemia and lateral sinus thrombosis	Meningitis	Unknown
40	Pharyngitis and streptococcic peritonitis	Progressive	Unknown
80	Streptococcic peritonitis	Progressive	Unknown

* Intravenous and intramuscular injections.
† Intravenous injection.

Of the 14 who survived, 8 were definitely benefited by the serum (table 8).

Patient 6 had a positive blood culture with an infinite number of colonies on the plate on the day the serum was given. The following day only one or two colonies were present, and on the second day there were none.

Patient 7 was a 2½ year old boy who had been ill for about six days. When serum therapy was started he had cervical adenitis, a temperature between 105 and 106 F. and a blood culture positive for hemolytic streptococci. On the first day he was given 30 cc. of convalescent serum and 60 cc. of whole blood by transfusion. Two days later the temperature rose to 107 F. After another 30 cc. of convalescent serum was given, the child began to show improvement, and this dose was repeated every other day. On the eighth day he received both serum and a second blood transfusion. By the time the fifth dose of serum was given, the cervical adenitis had developed into an abscess, which was drained surgically. Subsequently, the child was given two more doses of convalescent serum, the last being doubled, to 60 cc., and a third blood transfusion. Four days later the temperature dropped to normal, and the child made a complete recovery.

Patient 8 showed immediate improvement after the administration of serum, with subsidence in the cervical swelling. The recurrence of cervical swelling might have been prevented if a larger initial dose of serum had been given or if the dose had been repeated.

Patients 9, 10 and 11 did not receive sufficient serum for a fair trial.

Persons who have as severe attacks as those of patients 12 and 13 should be given larger doses of serum.

An appreciation of the background of patient 14 is essential if one is to understand why a beneficial effect from the serum was not noted. This child's illness began seven weeks prior to the administration of serum, with measles and

TABLE 8.—*Diverse Streptococcic Infections*

Day of Illness on Which Serum Was Given	Total Dose of Serum, Given Intramuscularly, Cc.	Case No.	Condition Present When Serum Was Given	Course After Administration of Serum
	40*	1	Streptococcic otitis media with convulsions	Striking improvement
Third	20	2	Streptococcic sore throat	Noticeable improvement
Fifth	40	3	Streptococcic throat and bilateral mastoiditis	Noticeable improvement
First	40	4	Streptococcic throat with pseudomembrane	Noticeable improvement
	30	5	Hemolytic streptococcic septicemia	Improvement
	160 4 doses	6	Streptococcic septicemia following scarlet fever	Blood culture became negative
Sixth	240 7 doses	7	Streptococcic septicemia and cervical adenitis; later, abscess	Ill one month; recovered fully
Second	20	8	Tonsillitis and cervical adenitis	Immediate improvement; cervical swelling reoccurred
Third	20	9	Streptococcic bilateral otitis media	Improvement after 11 days
Seventh	20	10	Otitis media following scarlet fever	Improvement after blood transfusion
	20	11	Erysipelas	No improvement
Eighth	60	12	Streptococcic mastoiditis and meningitis	No improvement
Fifteenth	60	13	Beta streptococcic septicemia	No improvement
Between sixth and seventh weeks	80* 2 doses	14	Beta streptococcic septicemia following measles	No improvement

* Intravenous injection.

otitis media. Before receiving convalescent serum she had undergone an operation for mastoiditis and sinus thrombosis and drainage for empyema, and at the time the serum was given she had suppurative foci elsewhere in the body, including sepsis in one hip. The administration of convalescent serum in the presence of undrained foci of infection, although it does appear to aid localization, has only a temporary effect.

Convalescent serum, in the experience of all observers, does not cause any unfavorable reactions. Only one patient in our series was reported as showing such a reaction—a slight urticaria following the injection of serum. Occasionally one sees persons who react to blood transfusions in this manner although the blood of both the donor and the recipient

belong to the same group and match perfectly. No matching of blood is required in the administration of convalescent serum, even though large doses are given intravenously.

COMMENT

The prevention of scarlet fever is important not only because the disease may prove to be a serious and expensive illness but because complications and sequelae so often follow even the milder forms. Human convalescent serum is an efficient and valuable prophylactic agent. In order that its administration may be most effective, two things must be kept in mind:

First, passive immunity can be relied on for only from ten days to two weeks; therefore, when contact with scarlet fever is prolonged or a severe epidemic is present, the injection of serum should be repeated at least every ten days.

Second, the dose of serum must be adequate. The determination of what constitutes an adequate dose depends on several factors—the age of the patient, the intimacy of the contact, the length of time since exposure and the virulence of the infection. It is better to play safe by giving an oversufficient rather than an insufficient dose of serum.

The favorable effects from the therapeutic use of convalescent serum in cases of scarlet fever have been generally confirmed. Convalescent serum not only shortens the course of the disease, reduces the incidence of complications and lowers the mortality rate, but also lowers the cost of the illness. All patients, regardless of how mild the attack, should receive convalescent serum therapeutically to forestall complications. Nephritis frequently follows attacks which were so mild as to have been overlooked at first. The results obtained by Hoyne, Levinson and Thalhimer,[16] mentioned previously, showed that nephritis occurred in mildly and moderately ill patients who were not treated with serum six times as frequently as it appeared in severely ill patients who were treated with serum.

Serum therapy also appears beneficial late in the course and in complicated attacks of scarlet fever and with a variety of severe streptococcic infections. It is essential in any type of case that the serum be administered at the earliest possible moment and in adequate doses. If clinical improvement fails to occur, the injections should be repeated every twelve to twenty-four hours as indicated. In cases of severe involvement it is better to give the serum by both the intravenous and the intramuscular route because the intravenous route allows immediate distribution of the serum while the intramuscular route provides a distributing center.

Doubtless, the morbidity from scarlet fever will decline further as the value of convalescent serum, when given early and in proper doses, becomes more widely recognized.

CONCLUSIONS

Of 102 patients exposed to scarlet fever at home who received convalescent serum for prophylaxis, 96.08 per cent did not have the disease.

Four of those treated with serum did have scarlet fever: In three the disease was definitely modified, and in the fourth a beneficial effect of the serum was evident.

The period of incubation was prolonged in all 4 patients.

Of 47 patients with scarlet fever who were given serum therapeutically, all but 1 showed improvement after treatment.

The percentage incidence of complications increases with each day's delay in the therapeutic administration of serum.

The use of convalescent serum lessens the incidence, the duration and the severity of complications in cases of scarlet fever.

Convalescent serum is also helpful in some attacks of other severe streptococcic infections.

RELATION OF MALOCCLUSION TO SIGMATISM

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The relation which malocclusion bears to sigmatism is still a controversial question. No one will deny that malocclusion may cause sigmatism, but its importance has been minimized by some and exaggerated by others. I believe that malocclusion does play an important rôle in sigmatism. It is my purpose not only to present some statistical evidence concerning the relation of malocclusion to sigmatism but to attempt to clarify the rôle which malocclusion plays in sigmatism. Before proceeding with this task it is necessary to state a few elementary definitions. Sigmatism may be defined as the faulty articulation of s or the sounds related to it (sh, z, zh, ch and j), or the interchange of these sounds among themselves or with other sounds. For instance, s may lack its normal sharpness or be too sharp or whistling. On the other hand, s may be replaced by another sound, such as th, d or l, or one sibilant may replace another, such as tsh for sh. Sigmatism constitutes the commonest form of single sound lalling. The defective articulation of other sounds occurs but is less frequent. The articulation of the child who suffers from a sigmatism may also display other sound defects or substitutions.

ETIOLOGY OF SIGMATISM

Sigmatism may be divided into two forms: (1) that in which the position of the tongue is normal and (2) that in which the position of the tongue is faulty. In persons in whom the position of the tongue is normal the sigmatism is due to an abnormal escape of air as the result of some mechanical defect of the organs of speech, such as missing teeth, open bite malocclusion or cleft palate. In persons in whom the position of the tongue is faulty the sigmatism may be due to motor ineptness, congenital word deafness, impaired hearing, mental retardation or some defect of the organs of speech. Two factors may be operating in a single instance of sigmatism, for instance, impaired hearing and malocclusion or motor ineptness and malocclusion, one factor in each instance being of secondary importance. Usually the malocclusion

is the less important. In view of these facts, the following classification of sigmatism is suggested:

1. Sigmatism due to a faulty position of the tongue
   (*a*) Functional motor ineptness
   (*b*) Congenital word deafness or high frequency deafness
   (*c*) Impaired hearing (obstructive or nerve deafness)
   (*d*) Mental retardation
   (*e*) Defective organs of speech (malocclusion, cleft palate).
2. Sigmatism due to an abnormal escape of air, as a result of some mechanical defect of the organs of speech, the position of the tongue being normal.

RELATION OF MALOCCLUSION TO SIGMATISM

Sigmatism due to an escape of air in the articulation of the sibilants is readily recognized. The position of the tongue is correct, but a space left by a missing tooth or a front open bite allows an abnormal escape of air in the articulation of s or one of its related sounds. However, if a malocclusion exists and the position of the tongue is faulty, one finds it difficult in many instances to determine the relation of the malocclusion to the sigmatism. Is the malocclusion of primary, of secondary or of no significance? In order to attempt to clarify the rôle which malocclusion plays in sigmatism the following points will be discussed: (1) sigmatism with normal occlusion, (2) malocclusions which are unrelated to sigmatism, (3) malocclusions which may be expected to cause sigmatism and (4) why speech often is normal in persons with malocclusions expected to cause sigmatism.

Sigmatism with Normal Occlusion.—In a person having sigmatism with normal occlusion the cause of the sigmatism must be a functional motor ineptness, congenital word deafness, high frequency deafness, impaired hearing or mental retardation. Congenital word deafness is so uncommon that for practical purposes it may be ignored. If the hearing and the intelligence are normal the sigmatism must be due to motor ineptness. This will be found to be the commonest cause of functional sigmatism. In many persons having sigmatism other evidences of lalling are presented, such as a faulty r or l sound or certain substitutions of one sound for another.

Malocclusions Which Are Unrelated to the Sigmatism.—Dental irregularities may exist which are unrelated to the sigmatism. In many instances the coincidental existence of the two conditions is easily established. Reports of a few cases will illustrate this.

Case 1.—Rose T., a girl aged 6 years, talked with a lisp. Two upper front teeth were missing. On analysis her speech was found to show the following sub-

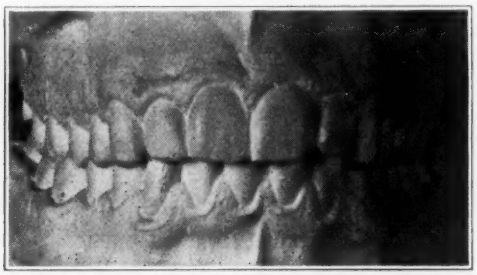

Fig. 1.—Normal occlusion. The arches and the individual teeth are in normal relation to each other, and the arches describe a normal curve.

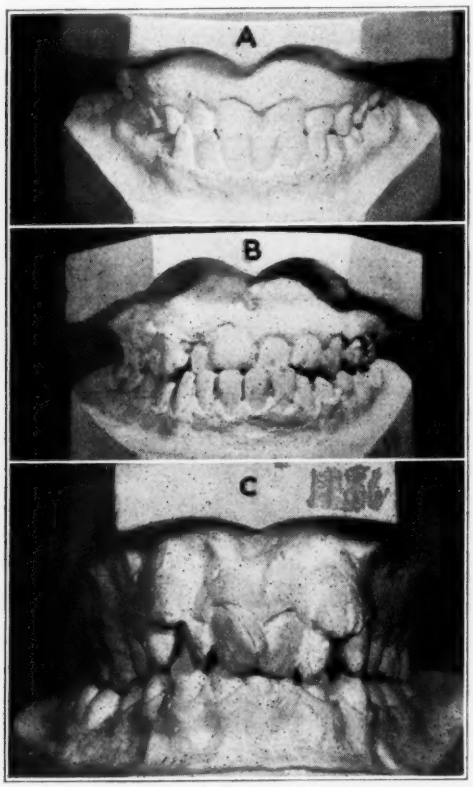

Fig. 2.—Types of malocclusion which are unrelated to sigmatism: *A*, protrusion of lower jaw, without open bite; *B*, edge to edge bite, with one biting edge in contact with the other, but with individual teeth in malocclusion; *C*, overjet of upper jaw, without open spaces.

stitutions: tsh for sh (chip for ship) and dzh for zh (meajure for measure). The diagnosis was sigmatism due to sound substitutions, and it was found that there was no relation between the lisp and the missing teeth.

Case 2.—Joseph S., a boy aged 15 years, articulated s, t, d and n with the tip of the tongue between the teeth. His teeth were widely spaced. The diagnosis was lalling, with no relation between malocclusion and sigmatism.

Case 3.—A boy aged 5 years articulated s and z with the tip of the tongue between the teeth. He also substituted w for r (wun for run) and f for th (free for three), and his l sound was faulty. He had a mild protrusion of the lower jaw. The diagnosis was lisping and other evidences of lalling, which were unrelated to the malocclusion.

Case 4.—Julia S., a girl aged 15 years, articulated sh with a right lateral emission. S and the other sibilants were normal. She showed a mild flaring of the upper front teeth. The diagnosis was lateral emission, with no relation to the malocclusion. The malocclusion should have caused a frontal emission or an interdental s rather than a lateral emission. Moreover, if the malocclusion and the sigmatism were related, s as well as sh should have been affected.

Case 5.—Margaret N., a girl aged 8 years, was mentally retarded. Her history was one of retardation of physical development and of onset of speech. On analysis of her speech, it was found that s and sh were articulated with the tip of the tongue between the teeth and yet she could articulate sh correctly because she used this sound to replace ch (shill for chill) and zh to replace j (Zherry for Jerry). Examination of her teeth revealed a mild protrusion of the lower jaw. The diagnosis was sigmatism due to substitutions of one sound for another and other evidences of lalling as the results of retarded intelligence.

Case 6.—Laura F., a girl aged 17 years, suffered from a right lateral sigmatism. Her s sound was weak. She spoke in a small, weak voice and dropped final sounds from words. Her r sound had a slight component of w or l. Other substitutions were zh for j (lezhion for legion) and sh for ch (wish for which). Her history revealed delayed development of speech. An audiogram showed a nerve deafness. Her lower jaw was retracted, and there was an excessive overbite. When the upper front teeth rested on the lower for the articulation of the sibilants there were wide lateral gaps. Her sigmatism and lalling speech, however, were primarily due to impaired hearing, and the malocclusion was of secondary or insignificant importance.

These cases illustrate that malocclusions may exist which are unrelated to the speech defect.

Malocclusions Which May Be Expected to Cause Sigmatism.—On the other hand there are certain malocclusions and dental gaps due to missing teeth or the tardy eruption of teeth which may be expected to cause sigmatism. Gutzmann [1] many years ago recognized that dental gaps and malocclusions which allowed an unnatural escape of air in the articulation of the sibilants were the cause of sigmatism. He also pointed out that frontal open bite and the loss of milk teeth often

1. Gutzmann, H.: Sprachheilkunde, Vorlesungen über die Storüngen der Sprache mit besonderer Berücksichtigung der Therapie, Berlin, H. Kornfeld, 1912, p. 574.

initiated the use of an interdental s. According to my experience, the following are the conditions which have been found to be the potential causes of mechanical or dental sigmatism: (1) frontal open bite or gaps, (2) protrusion of the upper jaw with horizontal overjet, (3) protrusion of the upper jaw with open bite, (4) widely spaced incisors and canines, (5) lateral open bite or gaps, (6) protrusion of

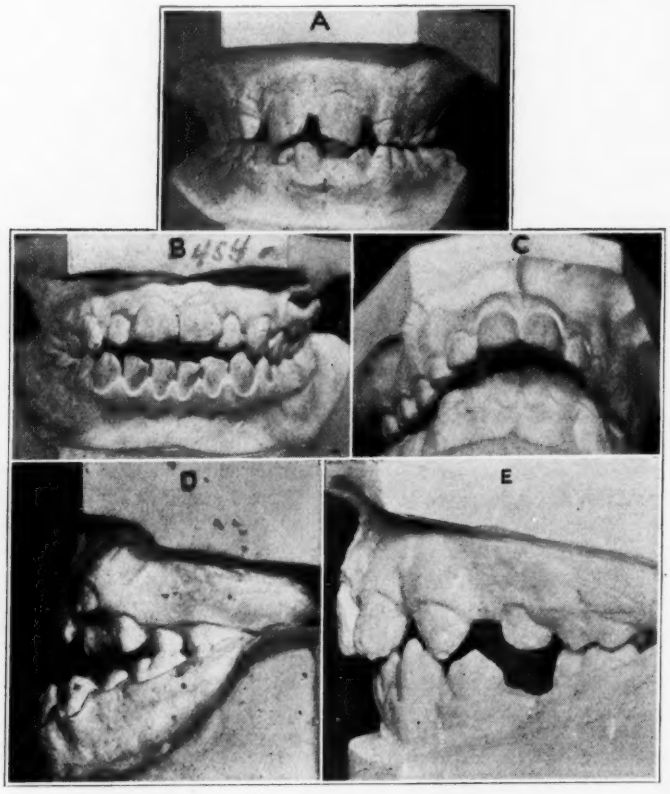

Fig. 3.—Types of malocclusion which may be expected to cause sigmatism: *A*, widely spaced incisors; *B*, frontal open bite; *C*, protrusion or flaring of upper incisors, with open bite; *D*, protrusion of lower jaw, with open bite, and *E*, lateral open bite.

the lower jaw with reversed overjet and (7) protrusion of the lower jaw with open bite.

Why Speech Often Is Normal in Persons with Malocclusions Expected to Cause Sigmatism.—The relation which malocclusion bears to sigmatism is often confused by the fact that one frequently observes instances of malocclusion or dental gaps which would lead one to expect a sigmatism, and yet speech is normal. How may this be explained?

If one observes the simple instance of a child or an adult who loses one or more teeth, one notices that the lisp that results may be of temporary duration because the person is able to accommodate himself to his loss. A person may have all his teeth extracted and yet experience only temporary difficulty with the sibilants. He learns to control his tongue in such a manner that he can produce these sounds normally. On the other hand, a person who suffers from motor ineptness, impaired hearing or mental deficiency may be unable to make the necessary accommodation.

Similarly, a person may accommodate himself to a malocclusion which is expected to cause sigmatism. This fact is borne out by observations and by the success attained in treating most persons with lisping caused by malocclusion. It is the deaf, the mentally retarded or the inept child who is usually resistant to treatment. The manner in which a person may obviate the occurrence of sigmatism due to malocclusion is as follows:

1. Gaps or spaces may be occluded with the tongue to prevent an abnormal escape of air. (If the gaps are lateral speech may be rendered slightly thick or indistinct.)

2. The tip of the tongue may be raised to the upper front teeth, the gum or the palate to prevent front emission.

3. In certain cases of front emission the lower lip may be raised to give the correct sound of s.

It is not necessary for the upper front teeth to rest vertically upon the lower in order to obtain the correct sound of s. An important requisite, however, is the presence of an adequate resistance for the current of air which passes down the central channel of the tongue. If some point of resistance other than that used normally can be utilized, the correct sound of s may be produced. Certain instances of malocclusion in themselves may provide such a resistance for the current of air. The following are examples:

1. Closed bite, in which the overjet is so extreme that the lower incisors touch the hard palate behind the upper incisors.
2. Edge to edge bite in which the upper and lower front teeth meet along the biting edge when the jaws are closed, and in which, though a malocclusion is present, the condition is normal for the articulation of s.
3. Protrusion of the upper or lower jaw, in which the incisors may meet, although not necessarily along the biting edge.

Therefore, there may exist an anomaly of occlusion which at first sight would lead one to expect sigmatism but which is compatible with

normal articulation of the sibilants. In some other instances the person more or less easily accommodates himself to his malocclusion. In still others the person has to be taught how to make this accommodation.

STATISTICAL DATA

Seventy-eight lisping children from the classes in speech of the Theodore Roosevelt High School of New York were analyzed for statistical purposes. Twenty-six per cent were found to have normal occlusion, and 74 per cent, malocclusion. Roughly, in only one third of the children with malocclusion could that anomaly be definitely related to the sigmatism. Of the remaining children with malocclusion, about

Data on Seventy-Eight Persons with Sigmatism

						Types of Malocclusion Related to Sigmatism					
Type of Sigmatism	No. of Cases	Percentage	Relation of Malocclusion to Sigmatism	No. of Cases	Percentage	Definitely	No. of Cases	Secondarily (Impaired Hearing)	No. of Cases	Possibly	No. of Cases
Lateral emission..	56	72	None.....	16	20	Frontal open bite.....	8	Frontal open bite..	2	Protrusion of upper jaw.....	2
Frontal emission..	13	17	Secondary or possible.....	20	26	Protrusion of upper jaw.....	4	Lateral open bite..	3	Lateral open bite or lateral gaps.....	13
Interdental sigmatism	5	6	Definite....	22	28	Widely spaced teeth.....	3				
				—	—						
			Total (malocclusion)	58	74						
Strident sigmatism	4	5	Normal occlusion..	20	26	Lateral open bite or lateral gaps.....	7				

one-third showed a secondary or possible relationship and another third showed no relationship (see table).

COMMENT

That malocclusion may cause sigmatism is generally recognized. Its importance as a cause of sigmatism, however, has given rise to debate. Gutzmann, who clearly recognized the rôle of malocclusion in relation to sigmatism, stated that the number of cases of sigmatism due to malocclusion is relatively small. Fröschels [2] also expressed the belief that the proportion is insignificant. On the other hand, certain authors such as Rapok,[3] Meder and Reichenbach [4] and Ueberhorst [5] found that about

2. Fröschels, E.: Lehrbuch der Sprachheilkunde, Leipzig, Franz Deuticke, 1925.

3. Rapok, cited by Barczinski.[6]

4. Meder and Reichenbach, cited by Barczinski.[6]

5. Ueberhorst, cited by Barczinski.[6]

75 per cent of lispers have anomalies of occlusion and saw a causal relation between the two conditions. Barczinski [6] pointed out that in arriving at their conclusions some of the authors failed to exclude such factors as mental retardation, impaired hearing and the loss of milk teeth as the primary cause of the sigmatism. He examined one thousand school children in Stuttgart in order to determine the relation of sigmatism to malocclusion. He found a ratio of thirty children with lisps to one hundred with anomalies of occlusion.

I believe that malocclusion plays an important rôle in sigmatism. Although I examined lisping children for malocclusions, instead of examining children with malocclusions for lisping as Barczinski did, the end-results of my survey coincided rather closely with those of his. I found that in about 28 per cent of the pupils who lisped there was a definite relation between the sigmatism and the malocclusion. In this group the position of the tongue was apparently normal in most instances, and the sigmatism was due to an abnormal escape of air, largely frontal emission.

In contrast to the group just described, 26 per cent of lispers showed a secondary or possible relation between the malocclusion and the sigmatism. Those considered as showing a secondary relation were five children who gave a history of impaired hearing. In the entire 26 per cent the position of the tongue was apparently faulty, and the group was characterized by lateral emission. Although it is reasonable to assume that malocclusion may interfere with the normal action of the tongue so that sigmatism results, such correlation is often difficult to establish. It is in this group, therefore, that the relation between malocclusion and sigmatism is obscure and controversial.

Finally, 20 per cent of the lispers showed no relation between the malocclusion and the sigmatism. In this group and in the pupils with normal occlusion (26 per cent), who nevertheless lisped—a total of 46 per cent—functional motor ineptness was considered the primary cause of the sigmatism, as impaired hearing and mental retardation were ruled out.

CONCLUSION

Sigmatism may result from one of several causes or from a combination of causes, including malocclusion. If the teeth are normal, the cause of sigmatism may be impaired hearing, mental retardation, or congenital word or sound deafness. If these factors can be ruled out, one may assume that sigmatism is functional and motor in character. Certain malocclusions will be recognized as the cause of sigmatism because they explain the abnormal escape of air or the faulty position

6. Barczinski, L.: Rôle of Malocclusion in Formation of Sibilants, Ztschr. f. Stomatol. **30**:1329, 1932.

of the tongue. If the malocclusion is unrelated to the sigmatism, it will fail to account for the faulty position of the tongue or the abnormal escape of air in the articulation of the sibilants. Certain persons with dental gaps or malocclusions which may be expected to cause sigmatism are able to accommodate themselves to the malocclusion so that speech is normal. Others have to be taught how to make this accommodation. Certain malocclusions are compatible with the normal production of sibilant sounds because such malocclusions provide an adequate resistance for the current of air passing down the central channel of the tongue. My statistical data show that a large number of lispers have malocclusion. But in only about 30 per cent of instances of lisping can a definite relation be seen between the malocclusion and the sigmatism.

Mrs. R. K. Wolf and Miss S. Center, of the Theodore Roosevelt High School, New York, assisted in this work. Drs. L. Kurland and S. Hemley, of the New York School of Dentistry, also assisted. The New York League for the Hard of Hearing did audiometer tests on a group of students.

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RICKETS RESISTANT TO VITAMIN D THERAPY

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In certain rare cases of rickets, in which the condition is frequently designated rachitis tarda or resistant rickets,[1] more vitamin D than the amount ordinarily effective for the prevention and cure of rickets is required. During the past six years six such cases have been encountered at the Children's Hospital. One of the patients in whom rickets was particularly resistant to vitamin D therapy, who is now 16 years of age, has been observed for fourteen years. The information at hand concerning this patient is pertinent not only to the treatment in such cases but also to a general consideration of rickets and vitamin D therapy. This study deals with the following specific questions concerning such cases:

First, is the abnormal condition of the bone due to true rickets? Second, what is the relation between the parathyroid function and the abnormal condition? Is there hyperparathyroidism, and if so is this a primary disorder of the parathyroid glands or hyperplasia secondary to rickets? Third, is the ineffectiveness of vitamin D therapy due to failure of its absorption from the gastro-intestinal tract? Fourth, will massive doses of vitamin D bring about healing of the rickets? Fifth, is it possible in such cases to push vitamin D therapy too far?

REPORT OF A CASE

W. M., a boy of Scotch-Irish parentage born in September 1920, was first seen at the Children's Hospital in the orthopedic outpatient department in October 1922. During the first year of life he was breast fed and received no cod liver oil or vitamin D concentrate. He walked at the age of 1 year. At the age of

From the Medical Clinics of the Massachusetts General Hospital and the Infants' and Children's Hospitals and the Departments of Medicine and Pediatrics, Harvard University Medical School.

1. (*a*) Bloomberg, M. W.: The Treatment of Persistent Rickets, Am. J. Dis. Child. **34**:624 (Oct.) 1927. (*b*) Gleich, M.: Arch. Pediat. **45**:504, 1928. (*c*) Shier, A., and Stern, A.: Arch. f. Kinderh. **78**:176, 1926. (*d*) Hess, J. H.: Rickets, Am. J. Dis. Child. **42**:488 (Aug.) 1931. (*e*) Shelling, D. H., and Hopper, K. B.: Calcium and Phosphorus Studies, ibid. **47**:61 (Jan.) 1934. (*f*) Highman, W. J., Jr., and Hamilton, B.: J. Pediat. **9**:56, 1936.

15 months he stopped walking, and his parents noticed that his legs were bowed. From that time to the time of the visit to the outpatient department, according to his mother, he had been given daily 1 teaspoonful of cod liver oil. According to the average potency of cod liver oil, this amount approximated 370 U. S. P. units of vitamin D per day. Examination showed a healthy child except for an open anterior fontanel, Harrison's groove, rachitic rosary, epiphysial enlargements and multiple deformities of the extremities. Roentgenograms showed rachitic changes at the epiphyses and marked periosteal reaction along the shafts of the deformed bones. A diagnosis of advanced active rickets was made, and 3 drachms (11 cc.) of cod liver oil (1,100 U. S. P. units of vitamin D) per day was prescribed.

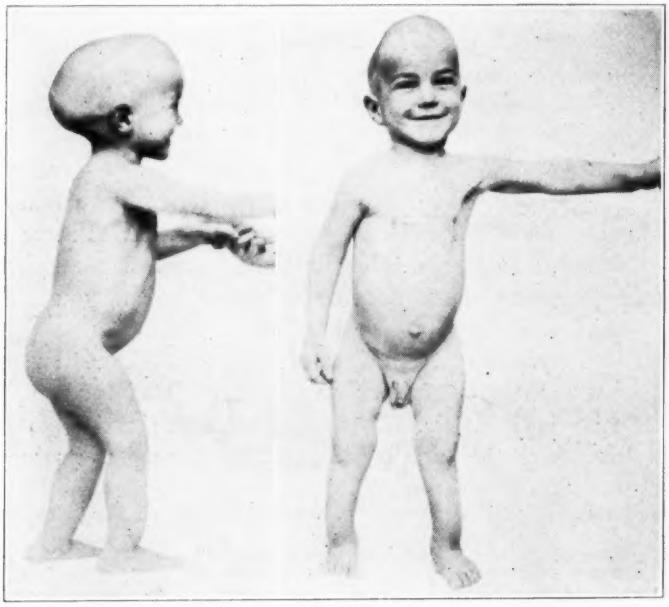

Fig. 1.—Photograph of the patient taken in January 1925, at the age of 4½ years, showing the deformities and the unusual shape of the head.

In July 1924 the child was admitted to the orthopedic service of the Children's Hospital because the deformities were increasing in spite of the cod liver oil and sunlight therapy (fig. 1). Roentgenograms showed no healing of the rickets. The calcium concentration of the serum was 10 mg. and the inorganic phosphorus concentration 1.6 mg. per hundred cubic centimeters. An intradermal tuberculin test with a dilution of 1:1,000 gave positive results. The boy was sent to the hospital's convalescent home, where the dose of 1 drachm (3.77 cc.) of cod liver oil three times a day was supplemented by intensive ultraviolet treatment from a Hanovia quartz mercury vapor arc lamp. After seven months the rickets had not healed, and the patient was discharged to his home with instructions that the cod liver oil be continued.

During 1926 he underwent two operations for the correction of the bony deformities. The calcium concentration of the serum varied from 10.5 to 7 mg.

and the inorganic phosphorus concentration from 2 to 3 mg. Examination of the urine showed no albumin, casts or cells. A phenolsulfonphthalein test showed 60 per cent excretion in two hours, and the nonprotein nitrogen level of the blood was within normal limits. The child was again sent to the convalescent home, where cod liver oil and heliotherapy were given for four months.

In 1927 another osteotomy was performed (fig. 2). The calcium concentration of the serum was 7.7 and the phosphorus concentration 2.2 mg. The child was again discharged to the convalescent home for two months, where 3 drachms of cod liver oil per day and treatments with an ultraviolet ray lamp were given.

A single visit to the outpatient department in 1931 showed active rickets (fig. 3).

At our request the patient was brought to the Children's Hospital in July 1932, and we saw him for the first time. Examination showed a moderately well nourished boy of 12 years, who weighed 23.6 Kg. and was 108 cm. in height. The liver was not remarkable; there was no jaundice. He had marked deformities of the lower part of his legs (fig. 4), a peculiarly shaped head, with a marked increase in the anteroposterior diameter (fig. 5), Harrison's groove, rachitic rosary, large wrists and only one bicuspid tooth instead of the normal eight for this age. The teeth present showed no defects in the enamel, such as are frequently associated with rickets. The blood pressure was 105 systolic and 70 diastolic.

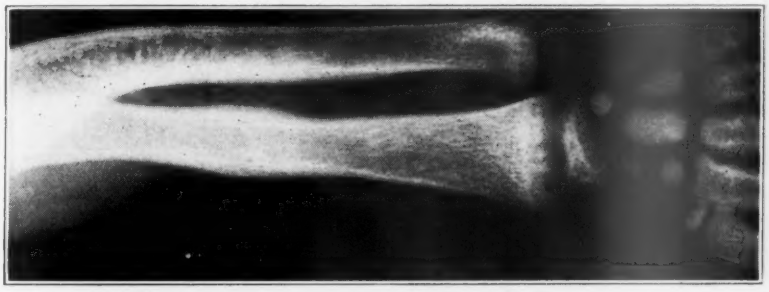

Fig. 2.—Roentgenogram taken in March 1927, when the patient was 6½ years old, showing marked rachitic changes at the epiphyses.

Tests of the blood showed that the red cell count was 4,950,000 per cubic millimeter, the white cell count 6,900 and the serum calcium content 10.5 mg., the serum inorganic phosphorus content 2 mg., the plasma phosphatase content 16.3 Bodansky [2] units (normal, from 5 to 9 units for a growing child) and the

2. The method of determining the serum phosphatase level was a modification of A. Bodansky's method (J. Biol. Chem. **101**:93, 1933), in which the substrate was prepared according to his method, with one hour's incubation, but the inorganic phosphorus was determined according to the method of C. H. Fiske and Y. Subbarow (J. Biol. Chem. **66**:375, 1925). This modification eliminated the necessity of any corrections. Before October 1933 determinations of the plasma, not the serum, phosphatase were done, and incubation was carried out for two hours instead of one hour. The values were considerably lower than the values for the serum phosphatase obtained with one hour's incubation and cannot be compared with them. Care was taken to specify in the tables and the text the type of determination in each instance.

blood nonprotein nitrogen content 17 mg., per hundred cubic centimeters. Tests of the urine showed no albumin, no sugar, no sediment and a specific gravity of from 1.004 to 1.030. An intramuscular injection of phenolsulfonphthalein showed 80 per cent excretion in one hour. The response to the sugar tolerance test was normal. The stools were of normal color and consistency, and their fat content was within normal limits.

Roentgenograms showed that all the bones were abnormal and of decreased density, little change having occurred since 1931 (fig. 3). There was evidence of multiple fractures. The trabeculae of the bones were coarse and markedly irregular.

Fig. 3.—Roentgenogram taken in April 1931, when the patient was 10½ years old, showing active rickets, deformities and multiple fractures.

The epiphysial lines were wide and presented changes characteristic of rickets. There was marked deformity of the bones. No cysts were seen. No lamina dura was visible about the teeth.

Thus, though this patient, who presented no history or signs of steatorrhea, renal insufficiency or hepatic disease, had received approximately 1,100 U. S. P. units of vitamin D per day for ten years and in addition had for several years received intensive heliotherapy, his rickets had remained active and unhealed.

During the next four years the patient was carefully observed and studied in order that we might answer the aforementioned questions.

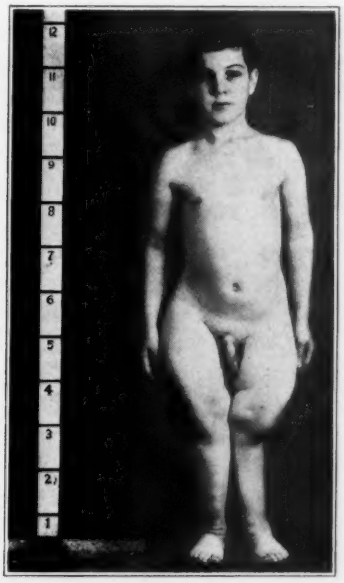

Fig. 4.—Photograph of the patient taken in April 1935, when he was 14½ years old.

Fig. 5.—Roentgenogram of the skull showing the long anterior-posterior diameter, the flat base, the evidence of increased intracranial pressure and the deformity at the base of the skull, presumably due to inability of the soft bones to withstand the weight of the skull.

WAS THE ABNORMAL CONDITION OF THE BONES TRUE RICKETS?

At the Children's Hospital on July 6, 1932, the patient was placed on a weighed, constant diet of moderate calcium and phosphorus content, and no vitamin D was given. After a foreperiod of twelve days, the balances of calcium and phosphorus were determined, as given for period I in table 1. The data for each period represent an average of the values obtained from the analyses [3] of the food, the urine and the stools in two separate three day periods.

On July 29, after the first metabolism period, 20 drops of halibut liver oil plus viosterol, containing approximately 5,000 U. S. P. units of vitamin D, was added to the daily diet, which was not altered. After fourteen days of this regimen, the balances of calcium and phosphorus were again determined (period II, table 1).

TABLE 1.—*Metabolic Data Showing the Lack of Effect of Ordinary Doses of Vitamin D by Mouth As Compared to That Observed in a Case of Ordinary Late Rickets, Together with Comparative Data on a Control Subject*

Patient	Period	Calcium, Gm. per Day				Phosphorus, Gm. per Day				Serum, Mg. per 100 Cc.		Plasma Phosphatase Units*	Vitamin D, U. S. P. Units
		Urine	Feces	Intake	Balance	Urine	Feces	Intake	Balance	Calcium	Phosphorus		
W. M.	I	0.04	0.64	0.76	+0.08	0.52	0.56	1.07	—0.01	9.3	2.2		
	II	0.03	0.62	0.76	+0.11	0.47	0.48	1.07	+0.12	10.0	2.0	....	5,000†
	III	0.06	1.26	1.43	+0.11	0.40	0.58	1.07	+0.09	10.8	2.1	....	5,000
	IV	0.03	0.57	0.76	+0.16	0.86	0.95	1.73	—0.08	9.5	2.3	16.3	5,000
A. M., usual type of rickets	I	0.002	0.89	1.04	+0.16	0.33	0.56	0.95	+0.06	7.0	1.7		
	II	0.003	0.45	1.28	+0.80	1.40	0.31	2.50	+0.80	10.9	4.1	High	5,000
M. C., fragilitas ossium	I	0.06	0.66	0.73	+0.01	0.48	0.27	1.04	+0.29	10.5	4.0	Normal	

* Modified Bodansky units.[2]
† 20 drops of viosterol (5,000 U. S. P. units of vitamin D).

Beginning August 19, calcium lactate was added to the diet in such an amount as approximately to double the calcium intake. After seven days, balances were determined (period III, table 1).

On September 3 the administration of calcium lactate was discontinued and disodium hydrogen phosphate was added to the diet in such an amount as almost to double the phosphorus intake. After seven days of phosphate therapy, the balances of calcium and phosphorus were determined (period IV, table 1).

3. The specimens were collected according to the method described by E. M. Mackay and A. M. Butler (J. Clin. Investigation **14**:923, 1935). The methods of analysis were those given by W. Bauer and J. C. Aub (J. Am. Dietet. A. **3**:106, 1927). Duplicate samples of food were also prepared for analysis by wet ashing with nitric acid. The values obtained from samples thus treated agreed with those for dry-ashed samples.

The table contains similar metabolic data on a 2½ year old boy, A. M., with late rickets and on an 8 year old girl, M. C., with fragilitas ossium. Except for the somewhat low calcium retention, the data for M. C. correspond approximately to the average values for the calcium and phosphorus metabolism of a child of this age group confined in bed without vitamin D or exposure to ultraviolet rays. Because these data were obtained simultaneously with those of W. M. while the diets of both patients were almost identical, they furnish approximately normal comparable figures. The urinary excretion of phosphorus of patient M. C. was approximately two-thirds the total excretion. The calcium and phosphorus metabolism of untreated patients with ordinary rickets, as shown in the data on patient A. M. (table 1) and those of Schabad,[4] Telfer [5] and others, is characterized by a low urinary excretion of calcium and a urinary excretion of phosphorus of approximately one-third the total excretion of phosphorus.

The metabolic data on the patient described in this paper, W. M. (table 1), show a relatively normal urinary excretion of calcium. Thus the urinary calcium seems higher than might be expected for untreated patients with rickets. The fecal calcium, though within normal limits in period I, was not diminished by the ingestion of vitamin D, whereas in cases of ordinary rickets it is markedly diminished by such therapy (table 1, patient A. M., period II).[6] The addition of calcium to the diet did not increase appreciably its retention or urinary excretion. In period I the amount of phosphorus in the urine was 50 per cent of the total amount excreted and was thus greater than it is in cases of ordinary rickets, in which the serum phosphorus concentration is equally reduced. The administration of vitamin D did not affect the partition of phosphorus between the urine and the feces or its retention, as it does in cases of rickets. In period IV the increase in the intake of phosphorus altered neither the proportion of phosphorus excreted by the bowels or the kidneys nor the retention of phosphorus, though the increased urinary excretion of phosphorus indicated an increased absorption of phosphorus.

These balance data are consistent with a diagnosis of either subacute rickets with the absorption of calcium and phosphorus and the urinary excretion midway between that of the normal child and that of the ordinary rachitic patient or, perhaps, active rickets accompanied by hyperparathyroidism severe enough to raise the urinary excretion of calcium and phosphorus above the levels usually observed in cases of rickets. In either case, the rickets was resistant to ordinary doses of vitamin D or even larger doses, for during the next six weeks, while the patient was receiving a diet high in calcium and phosphorus, 60 drops

4. Schabad, J. A., and Sorochowitch: Arch. f. Kinderh. **57**:276, 1912.
5. Telfer, S. V.: Quart. J. Med. **16**:45 and 63, 1922.
6. Schabad.[4] Telfer.[5]

of halibut oil plus viosterol (15,000 U. S. P. units of vitamin D) daily and treatment with an ultraviolet ray lamp had no effect on the epiphysial lesions as visualized by roentgenograms or on the calcium and inorganic phosphorus levels of the serum and the phosphatase levels of the plasma.

The roentgenograms and the metabolic data, therefore, are not incompatible with the theory that the disease was rickets. Later, a portion of the sternum taken for biopsy in the course of a parathyroid

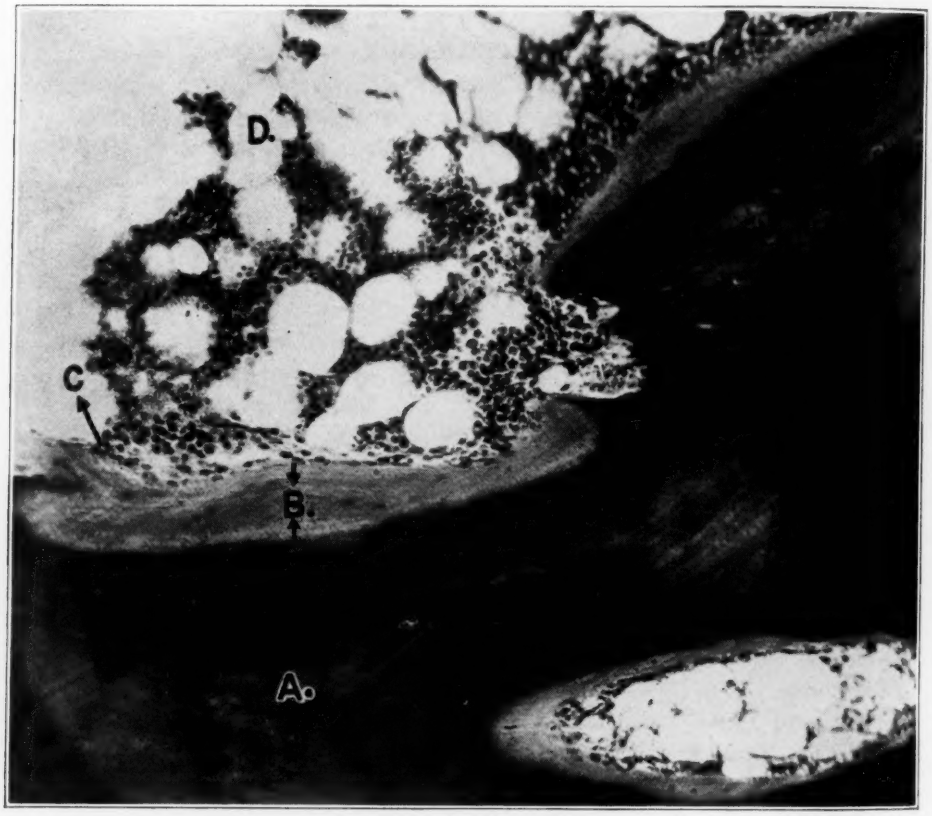

Fig. 6.—Photomicrograph of the portion of the sternal bone taken for biopsy. The specimen was decalcified with Müller's fluid to demonstrate the width of the osteoid seams. *A* indicates calcified bone; *B*, the osteoid seam; *C*, a row of osteoblasts, and *D*, the bone marrow. The extreme width of the osteoid seams is evident.

exploration, though it did not include a portion of an epiphysis, showed on microscopic examination wide osteoid seams around all the trabeculae and normal marrow without fibrosis (fig. 6). The amount of osteoid tissue and the absence of a great number of osteoclasts and of fibrosis

clearly differentiated the condition from von Recklinghausen's osteitis fibrosa. Such an amount of uncalcified osteoid tissue is associated only with true rickets or osteomalacia. In renal rickets [7] and hepatic rickets [7f] the osteoid borders of the trabeculae are narrow or absent and there is marked fibrosis of the marrow.

Thus, from the evidence of histologic examination of the bone, of roentgenograms and of calcium and phosphorus metabolism the abnormal condition of the bones appeared to be true rickets.

WAS PARATHYROID DYSFUNCTION A FACTOR IN THE DISEASE?

That there is hyperparathyroidism in rickets is now generally accepted.[8] Evidence suggesting a secondary or compensatory character of the hyperplasia is furnished in the experiments of Higgins, Sheard and Wilder on rachitic chicks,[9] in which injections of parathyroid extract prevented the hyperplasia that was present in the chicks not given the extract. Hoag, Rivkin, Weigele and Berliner [10] observed that injections of parathyroid extract into patients with rickets produced no significant increase in the serum calcium concentration. Morgan [11] and Jones [12] after experiments on dogs said that this lack of response to parathyroid extract was due to an absence of readily available calcium.

Our patient was given 10 units of parathyroid extract three times a day for three separate three day periods from October 26 to November 8. The serum calcium level at the end of these periods was, respectively, 10.8, 11.3 and 10.7 mg. per hundred cubic centimeters, whereas in normal control subjects the serum calcium rose to between 15 and 22 mg. Though this failure of the serum calcium concentration of our patient to rise in response to parenterally introduced parathyroid extract was not diagnostic of a parathyroid tumor, it at least showed that an overproduction of hormone might be present without hypercalcemia.

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7. (*a*) Paterson, D. H.: Brit. J. Child. Dis. **18**:186, 1921. (*b*) Shipley, P. G.; Park, E. A.; McCollum, E. V., and Simmonds, N.: Is There More Than One Kind of Rickets? Am. J. Dis. Child. **23**:91 (Feb.) 1922. (*c*) Langmead, F. S., and Orr, J. W.: Arch. Dis. Childhood **8**:265, 1933. (*d*) Smyth, F. S., and Goldman, L.: Renal Rickets with Metastatic Calcification and Parathyroid Dysfunction, Am. J. Dis. Child. **48**:596 (Sept.) 1934. (*e*) Shelling, D. H., and Remsen, D.: Bull. Johns Hopkins Hosp. **57**:157, 1935. (*f*) Personal observations.

8. (*a*) Erdheim: Denkschr. d. k. Akad. d. Wissensch. Math-Naturw. Kl. **90**:363, 1914. (*b*) Ritter, C.: Frankfurt. Ztschr. f. Path. **24**:137, 1920. (*c*) Pappenheimer, A. M., and Minor, J.: J. M. Research **42**:391, 1921. (*d*) Higgins, G. M., and Sheard, C.: Am. J. Physiol. **85**:299, 1928. Highman and Hamilton.[1f]

9. Higgins, G. M.; Sheard, C., and Wilder, R. M.: Proc. Staff Meet., Mayo Clin. **7**:311, 1932.

10. Hoag, L. A.; Rivkin, H.; Weigele, C. E., and Berliner, F.: Effect of Potent Parathyroid Extract on Calcium Balance in Infants, Am. J. Dis. Child. **33**:910 (June) 1927.

11. Morgan, A. F.: Am. J. Physiol. **105**:621, 1933.

12. Jones, J. H.: J. Biol. Chem. **111**:155, 1935.

Exploration of the parathyroid glands, therefore, seemed justified, and the patient was transferred to the Massachusetts General Hospital, where an operation was performed on Nov. 29 by Dr. Oliver Cope. The portion of the bone from the sternum was taken for biopsy at this time. Only three parathyroid glands were identified. None was definitely enlarged. One gland was removed. Microscopic examination showed definite hyperplasia (fig. 7) of the type observed in cases of rickets by Pappenheimer and Minor, [8c] in cases of nephritis by Castleman and Mallory,[13] Smyth and Goldman [7d] and Shelling and Remsen [7e] and in a case of late rickets with parathyroid hyperplasia by Linder and Vadas.[14] The cells were mostly of the "chief cell" type. Though there was vacuolation of some of these cells, they did not resemble the "clear cell" which Castleman and Mallory [15] observed in association with the primary parathyroid hyperplasia with hyperparathyroidism described by Castleman, Churchill and two of us (Albright and Bloomberg).[16]

After this operation the calcium concentration of the serum fell in four days from 10.5 to 7 mg., the inorganic phosphorus concentration rose from 2.3 to 3.4 mg. and the patient had mild tetany. The phosphatase concentration of the plasma, which before operation was 16.2 Bodansky units per hundred cubic centimeters, fell abruptly to 7.4 units. As the patient lost only 1 pound (453 Gm.) in the immediate postoperative period and did not undergo any period of starvation, these changes in serum concentration cannot be attributed to such effects of starvation as were observed by McCollum, Simmonds, Shipley and Park [17] in experiments with rickets in rats. Moreover, the concentrations of serum calcium and phosphorus and plasma phosphatase returned to the preoperative levels gradually over a period of about six weeks (fig. 8, M. G. H., admission 1), whereas Cavins [18] observed that the effect of starvation on the serum values in rachitic rats disappeared within two days after the diet was resumed. Smith and Maizels,[19] Smith [20] and Bodansky and Jaffe [21] observed that in cases of rickets the serum

13. Castleman, B., and Mallory, T. B.: To be published.

14. Linder, G. C., and Vadas, D. G. M.: Lancet **2**:1124, 1931.

15. Castleman, B., and Mallory, T. B.: Am. J. Path. **11**:1, 1935.

16. Albright, F.; Bloomberg, E.; Castleman, B., and Churchill, E. D.: Hyperparathyroidism Due to Diffuse Hyperplasia of All Parathyroid Glands Rather Than Adenoma of One, Arch. Int. Med. **54**:315 (Sept.) 1934.

17. McCollum, E. V.; Simmonds, N.; Shipley, P. G., and Park, E. A.: Bull. Johns Hopkins Hosp. **33**:31, 1922.

18. Cavins, A. W.: J. Biol. Chem. **59**:237, 1924.

19. Smith, J., and Maizels, M.: Arch. Dis. Childhood **7**:149, 1932.

20. Smith, J.: Arch. Dis. Childhood **8**:215, 1933.

21. Bodansky, A., and Jaffe, H. L.: Phosphatase Studies: Serum Phosphatase as Criterion of Severity and Rate of Healing of Rickets, Am. J. Dis. Child. **48**: 1268 (Dec.) 1934.

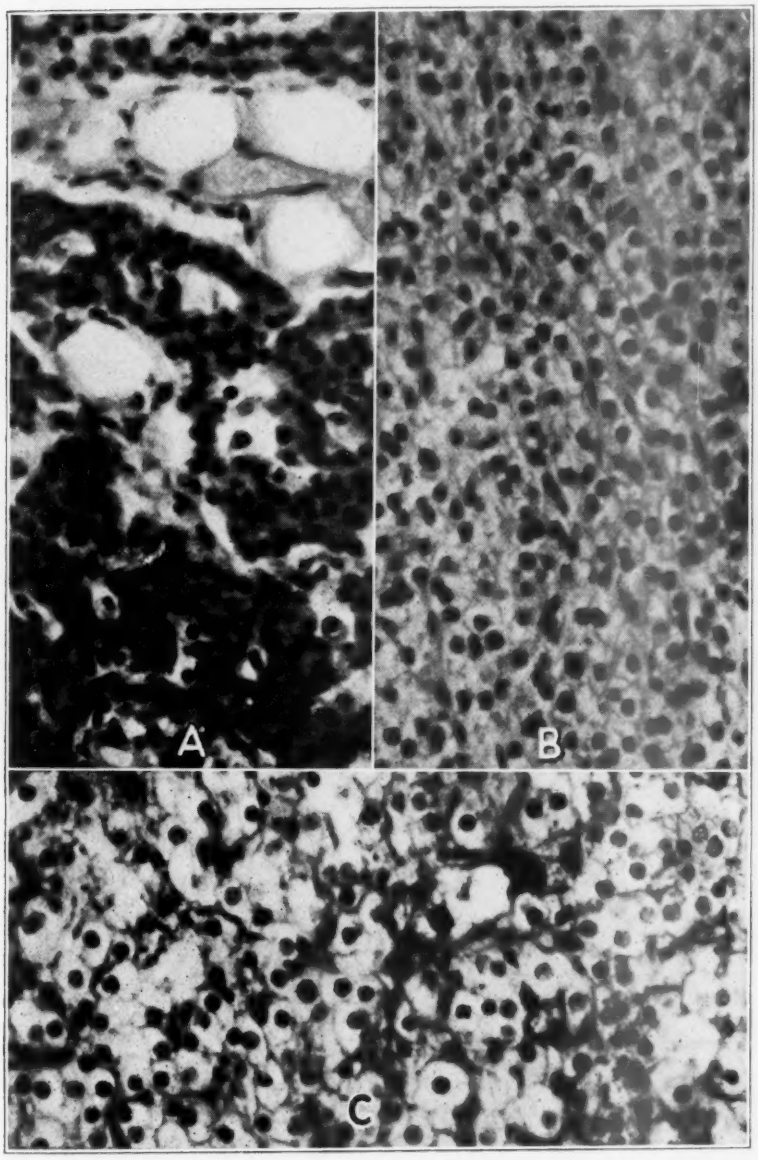

Fig. 7.—Photomicrographs (× 330) of parathyroid tissue from three persons: *A*, a patient of 12 without parathyroid disease; *B*, the patient reported on in this paper, and *C*, a patient with primary hyperplasia of the parathyroid tissue and hyperparathyroidism. The tissue of our patient (*B*) differs from that of the normal child (*A*) in that there are fewer fat cells and the epithelial cells have clearer cytoplasm. In primary hyperplasia (*C*) the epithelial cells are much larger.

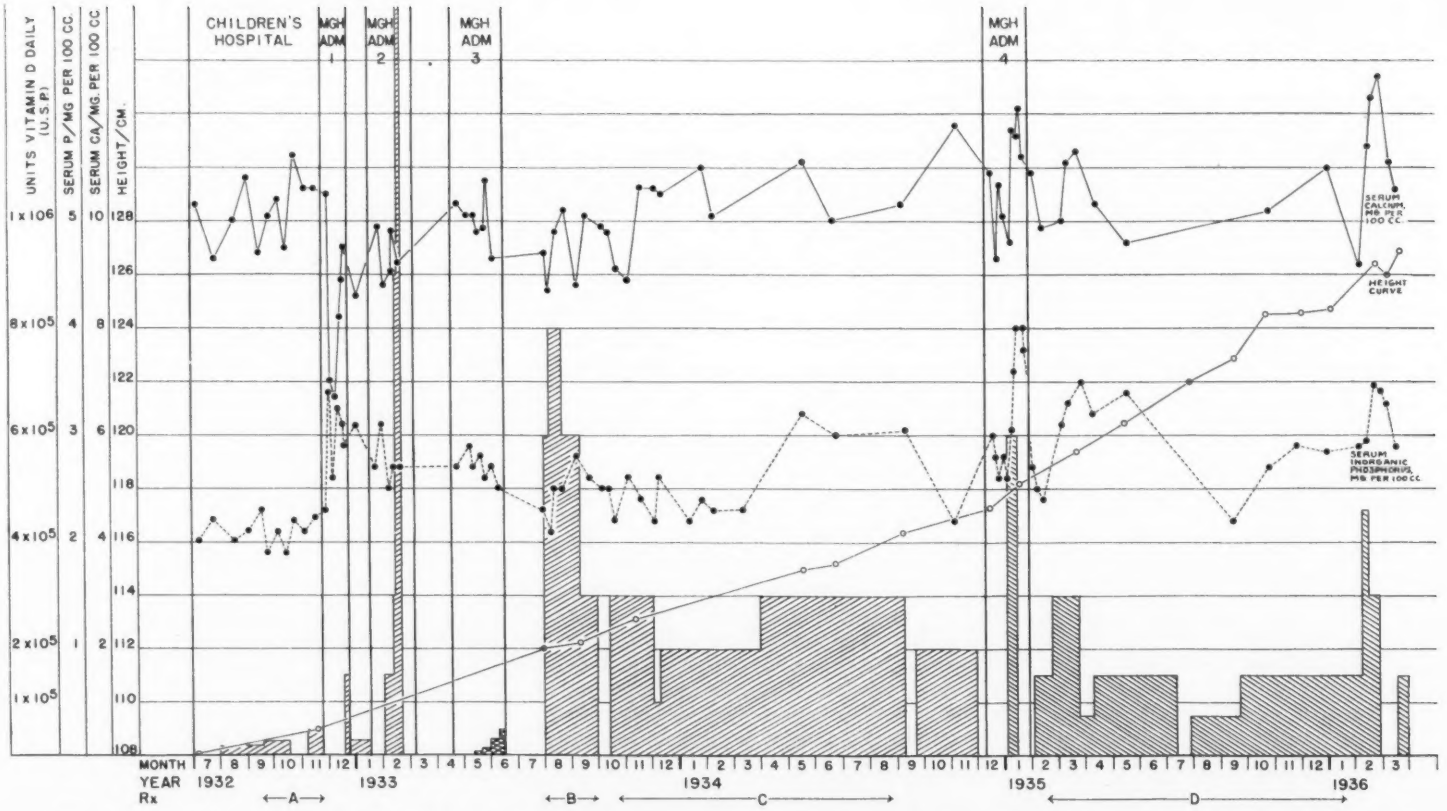

Fig. 8.—Metabolic data from July 1932 to March 1936. *A* indicates that 0.7 Gm. of calcium and 0.7 Gm. of phosphorus were added to the daily diet; *B*, that 6 Gm. of calcium glycerophosphate was added; *C*, that 4 Gm. of sodium glycerophosphate was added, and *D*, that 6 Gm. of calcium glycerophosphate in a glass of milk was given three times daily. The dose of vitamin D is indicated by the hatched areas. The cross-hatched area represents the point at which vitamin D was given in a crystalline preparation. The dots and unbroken line indicate the calcium content of the serum and the dots and broken line the inorganic phosphorus content, in milligrams per hundred cubic centimeters. The circles and unbroken line indicate the height in centimeters.

phosphatase concentration returned to normal only when the rickets was healed, and they suggested the phosphatase concentration as an index of the degree of healing of rickets. Although their conclusion is probably true in most instances, the drop in the plasma phosphatase concentration to within normal limits during the postoperative period was not associated with healing of the rickets as indicated by roentgenograms or by the product of the concentrations of serum calcium and inorganic phosphorus.

From this postoperative experience, in spite of the fact that the fourth parathyroid gland was not seen, it can be concluded that the condition of this patient was not due to a parathyroid tumor. If it had been and the tumor had been missed at the time of the operation, there would not have been any change, certainly not so marked a one, in the calcium and phosphorus levels after operation.

The postoperative changes in the serum calcium and phosphorus concentrations in this patient may be explained hypothetically as follows: Coincident with the rickets there was, as shown by the biopsy of the specimen of parathyroid gland, secondary hyperparathyroidism. The hyperplastic parathyroid glands apparently were producing close to their maximum output, for on the removal of one gland the remaining glands were unable to increase the output of hormone as would normal glands, and the calcium level of the serum fell and the inorganic phosphorus level rose. The removal of one parathyroid gland in a normal person does not cause a marked change in the serum calcium level (unreported personal observation). The large preoperative amount of parathyroid hormone produced the low inorganic phosphorus level of the serum [22] and explained the lack of response to the parenterally administered parathyroid extract. If there was a calcium deficiency, which required an overproduction of the hormone for the maintenance of a normal serum calcium level, any added hormone from without would be less effective in raising the calcium level.

The degree of fall in the serum calcium concentration postoperatively suggests the importance of the parathyroid hormone in maintaining a relatively normal serum calcium concentration in cases of rickets, in which a deficiency and limited absorption of calcium occur. The rapid rise in the inorganic phosphorus level of the serum following operation is significant, since it suggests that the low phosphorus level in rickets is dependent primarily on an excess of parathyroid hormone rather than on other factors, such as decreased phosphorus absorption.

The conclusion can be drawn that primary hyperparathyroidism was not the cause of the condition but that secondary hyperparathyroidism, as in ordinary rickets, was a definite feature of the disease.

22. Albright, F., and Ellsworth, R.: J. Clin. Investigation **7**:183, 1929.

6 Gm. of calcium glycerophosphate in a glass of milk was given three times daily. The dose of vitamin D is indicated by the hatched areas. The cross-hatched area represents the point at which vitamin D was given in a crystalline preparation. The dots and unbroken line indicate the calcium content of the serum and the dots and broken line the inorganic phosphorus content, in milligrams per hundred cubic centimeters. The circles and unbroken line indicate the height in centimeters.

WAS FAULTY ABSORPTION OF VITAMIN D A FACTOR?

The fact that ultraviolet radiation proved ineffective in healing the rickets was indirect evidence that the resistance to vitamin D therapy was not due to faulty absorption of vitamin D. In order that we might obtain more direct evidence on this question, a crystalline preparation of vitamin D[23] was administered intravenously (table 2 and fig. 8, M. G. H., admission 3). As may be seen from the values for the serum calcium and inorganic phosphorus and the plasma phosphatase and the metabolic data in table 2, this medication had no demonstrable effect.

TABLE 2.—*Metabolic Data Showing the Lack of Effect of Calciferol Injected Intravenously on the Calcium and Phosphorus Metabolism. The Metabolic Data Agree with the Findings in Table 1, and Sodium Bicarbonate Had Little Effect on the Excretion of Calcium and Phosphorus*

	Calcium, Gm. per Day				Phosphorus, Gm. per Day				Serum, Mg. per 100 Cc.				
Period	Urine	Feces	Intake	Balance	Urine	Feces	Intake	Balance	Calcium	Phosphorus	Plasma Phosphatase Units*	Calciferol, U. S. P. Units of Vitamin D	Other Medication, Gm.
I	0.02	0.59	0.76	+0.15	0.44	0.38	1.07	+0.25					
II	0.03	0.34	0.76	+0.39	0.49	0.43	1.07	+0.15					
III	0.04	0.56	0.76	+0.16	0.42	0.48	1.07	+0.17	.....	...	..	.....	$NaHCO_3$, 6
IV	0.03	0.52	0.76	+0.21	0.45	0.35	1.07	+0.27	10.1 (II)†	2.9	11	.....	$NaHCO_3$, 6
									10.1 (III)	2.7	12	.....	
V	0.03	0.64	0.76	+0.09	0.48	0.48	1.07	+0.11					
VI	0.02	0.57	0.76	+0.17	0.43	0.43	1.07	+0.21	(III)	...	15		
VII	0.02	0.64	0.76	+0.10	0.41	0.49	1.07	+0.17	.....	...	..	2,700	
VIII	0.03	0.55	0.76	+0.18	0.57	0.43	1.07	+0.07	9.8 (II)	2.4	..	4,000	
IX	0.02	0.52	0.76	+0.22	0.47	0.48	1.07	+0.12	9.8 (II)	2.7	..	9,300	
X	0.02	0.59	0.76	+0.15	0.42	0.47	1.07	+0.18	10.8 (II)	2.6	..	12,000	
XI	....	....	0.76	.....	....	....	1.07	.....	.....	...	..	12,000	
XII	.....	....	0.76	.....	....	....	1.07	.....	9.3 (I)	2.7	..	16,000	
XIII	....	....	0.76	.....	....	....	1.07	.....	.....	...	..	16,000	
XIV	0.01	0.53	0.76	+0.22	0.48	0.36	1.07	+0.23	(III)	2.5	13	24,000	
XV	0.01	0.66	0.76	+0.09	0.50	0.39	1.07	+0.18	.....	...	..	16,000	
XVI	0.01	0.57	0.76	+0.18	0.43	0.37	1.07	+0.27	.....	...	..	32,000	

* Modified Bodansky units.[2]
† The Roman numeral indicates on which day of the period the determination was made.

It therefore seems fair to assume that failure to absorb vitamin D was not the cause of this patient's disorder.

WOULD MASSIVE DOSES OF VITAMIN D PRODUCE AN ANTIRACHITIC EFFECT?

To learn whether the patient was merely resistant to vitamin D therapy or absolutely refractory, we made additional metabolic studies (fig. 8, admission 2, and table 3). In the table each period again represents three days. The data covering the calcium and phosphorus

23. The preparation used was calciferol. It was supplied by Sir Henry H. Dale, of the National Institute of Medical Research, Hampstead, England. At the time of our investigation, May 1933, this substance was not available in this country.

balances for the first four control periods agree closely with those found at the Children's Hospital. The slightly lower values for the urinary excretion of calcium were probably due to the fact that the serum calcium had not quite returned to the preoperative level. During the next three periods the patient received 15 cc. of viosterol (150,000 U. S. P. units of vitamin D) daily without effect. His viosterol was then increased until he was receiving, during period X, 1,500,000 U. S. P. units of vitamin D daily. With these massive doses there were a marked lowering of the calcium and phosphorus content of the feces, an increase in the retention of calcium and phosphorus, a rise in the urinary excretion of calcium and a slight but definite lowering of the urinary excretion of phosphorus. With the exception of the last-

TABLE 3.—*Metabolic Data Showing That Extreme Doses of Vitamin D Administered Orally as Viosterol Were Followed by Marked Changes in the Calcium and Phosphorus Metabolism*

Period	Calcium, Gm. per Day				Phosphorus, Gm. per Day				Serum, Mg. per 100 Cc.		Plasma Phosphatase Units*	Vitamin D, U. S. P. Units
	Urine	Feces	Intake	Balance	Urine	Feces	Intake	Balance	Calcium	Phosphorus		
I	0.01	0.65	0.76	+0.10	0.53	0.54	1.07	0.00				
II	0.01	0.61	0.67	+0.05	0.51	0.42	0.95	+0.02				
III	0.01	0.74	0.76	+0.01	0.44	0.49	1.07	+0.14	9.9 (I)†	2.7	10.5	
IV	0.01	0.60	0.76	+0.15	0.55	0.37	1.07	+0.15				
V	0.01	0.78	0.76	−0.03	0.53	0.53	1.07	+0.01	.....	...	....	150,000
VI	0.02	0.59	0.76	+0.15	0.56	0.39	1.05	+0.10	8.8 (II)	3.1	10.6	150,000
VII	0.01	0.56	0.76	+0.19	0.56	0.31	1.07	+0.20	.....	...	....	150,000
VIII	0.01	0.56	0.76	+0.19	0.49	0.27	1.07	+0.31	9.8 (III)	2.7	....	300,000
IX	0.01	0.38	0.76	+0.37	0.43	0.26	1.07	+0.38	9.2 (II)	2.7	....	1,100,000
X	0.04	0.17	0.76	+0.55	0.43	0.16	1.07	+0.48	.....	...	....	1,500,000
XI	0.04	0.21	0.76	+0.51	0.56	0.20	1.07	+0.31	9.6 (I)	2.9		
XII	0.03	0.28	0.76	+0.45	0.57	0.20	1.07	+0.30	11.0 (III)	2.5	8.7	

* Modified Bodansky units.[2]
† The Roman numeral indicates on which day of the period the determination was made.

mentioned effect, the changes in balances are consistent with those observed in cases of healing rickets (table 1, patient A. M., period II). The low urinary excretion of phosphorus as compared with that associated with ordinary healing rickets might well be due to the fact that in patient W. M. the inorganic phosphorus level of the serum was not elevated (table 3) by the vitamin D therapy as it is in cases of ordinary healing rickets (table 1, patient A. M.). With these large doses of vitamin D the plasma phosphatase content fell slightly (table 3), though the rickets was not healed (fig. 9 *A*). A month later the phosphatase returned to its preoperative high level. It may be noted in figure 8 that during the subsequent administration of massive doses of vitamin D the inorganic phosphorus concentration of the serum rose. During periods XI and XII no viosterol was given. The balances showed a tendency toward a return to the previous state of increased fecal excretion of

calcium and phosphorus and increased urinary excretion of phosphorus. Since the effect of vitamin D therapy may persist for a considerable period after its administration, a more marked return would not be anticipated.

The height curve, figure 8, is of interest as an index to the patient's condition. When his rickets was not under control, the gain in height was limited by deformity of the newly laid down bone. It may be seen that with the massive vitamin D treatment he was gaining almost 1 cm. a month.

With continuation of the large doses of vitamin D, roentgenograms showed healing of the rickets (figs. 9 and 10). Therefore, massive doses of vitamin D did produce an antirachitic effect which caused healing of the rickets.

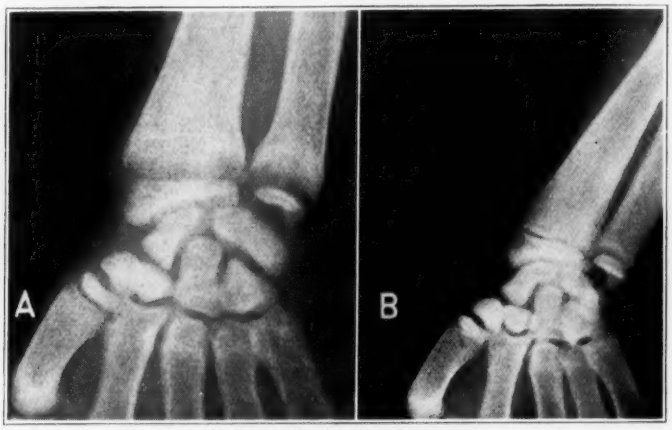

Fig. 9.—Roentgenograms of the wrists taken on Feb. 18, 1933 (*A*), and March 7, 1936 (*B*), before and after the healing of the rickets by massive doses of vitamin D. The changes in the epiphysial lines are evident.

WAS IT POSSIBLE EVEN WITH THIS PATIENT TO GIVE TOO MUCH VITAMIN D?

The metabolic data pertaining to the patient's fourth admission to the Massachusetts General Hospital (fig. 8), when phosphate salts were given intravenously, will be discussed in detail in a subsequent paper. During this period and afterward the patient was given his vitamin D orally in the form of crystalline vitamin D rather than as viosterol.[24]

24. The vitamin D for this entire investigation was supplied by the Winthrop Chemical Company, first in the form of viosterol and later in the form of crystalline vitamin D. The crystalline preparation contained 40,000,000 U. S. P. units of vitamin D per gram and was supplied in a propylene glycol solution containing approximately 10,000 U. S. P. units per cubic centimeter.

The rise in the calcium and inorganic phosphorus concentrations of the serum during the fourth admission was striking. With the elevation in these concentrations, the phosphatase level fell, but it remained well above normal. It is of interest to see how from then on especially, but also previously, the calcium and inorganic phosphorus concentrations increased and decreased with the dose of vitamin D. Attention should be called to the six months beginning with October 1935. For the first

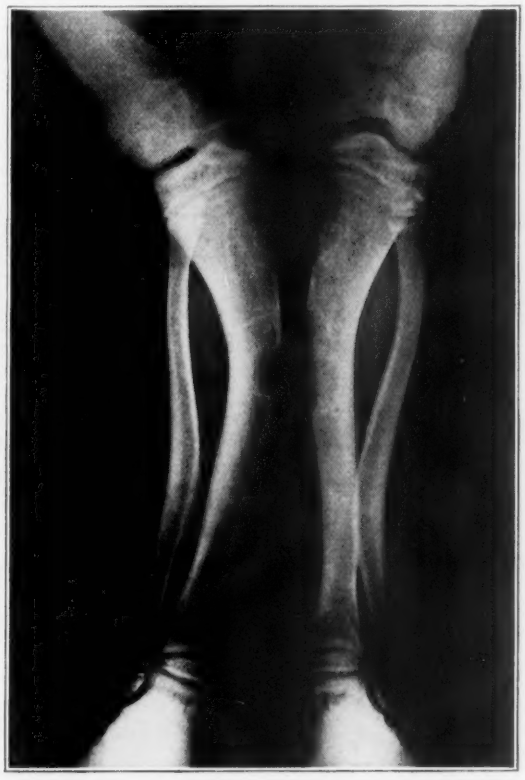

Fig. 10.—Roentgenogram of the lower extremities taken on Oct. 26, 1936, after the active rickets had healed. The normal epiphysial lines and the marked abnormality in the texture of the bones are evident.

four and one third of these months, 15 cc. of a propylene glycol solution of crystalline vitamin D,[24] or approximately 150,000 units of vitamin D, was given daily. The phosphatase content of the serum remained high, and the inorganic phosphorus content was below 3 mg. per hundred cubic centimeters. It therefore seemed wise to increase the dose, and it was approximately doubled. The calcium content of the serum rose to 12.7 mg. and the phosphorus content to 3.5 mg., and the phosphatase content

fell to 13.5 Bodansky units, per hundred cubic centimeters.[2] This increase in the serum calcium and phosphorus was fortunately noted at once, so the dose was lowered and was eventually stopped for a short time. At the height of the rise in the blood values the urine was loaded with calcium and contained many calcium casts such as have been observed in cases of hyperparathyroidism.[25] It is probable that a continuation of this regimen would have led to serious consequences. A comparison of the response to the doses of viosterol given during the second admission to the Massachusetts General Hospital and at home between admissions 3 and 4 (fig. 8) with the response to the doses of crystalline vitamin D in propylene glycol during admission 4 and subsequently suggests that the latter preparation is the more effective. The evidence for this, however, is not conclusive; the condition of the patient was not the same in the periods of different therapy, since considerable healing of the rickets had resulted from the viosterol. The point to be emphasized is that, whereas massive doses were necessary to produce a cure, it was possible to give too much. Frequent tests of the blood, therefore, were essential for the determination of adequate but at the same time not dangerously excessive therapy.

COMMENT

Ordinary infantile rickets generally is considered a specific deficiency disease in which the quantity of specific agents, i. e., vitamin D or ultraviolet rays, required for the prevention or cure of the disease depends particularly on the amount of calcium and phosphorus in the diet. Small amounts of the specific agents are usually sufficient to defend the average person on a normal diet from the disease. Steatorrhea predisposes one to rickets presumably because vitamin D, being fat soluble, is lost in the fat of the stools. Renal insufficiency and disease of the liver predispose the patient to rickets-like conditions, which, however, are not true rickets. Certain patients, however, in the absence of these predisposing factors acquire true rickets when receiving an amount of the specific agent usually adequate for prophylaxis, and such patients fail to respond to doses that ordinarily effect a cure. There has been considerable doubt as to whether the decrease in the effectiveness of vitamin D in such patients is due to lack of absorption of the vitamin or to an intrinsic factor which resulted in a resistance to the vitamin's action.

From the data submitted in this paper it is clear that the failure of our patient to respond to vitamin D was due to an intrinsic resistance to the effectiveness of this agent. During the period of intravenous administration of crystalline vitamin D[23] there was no doubt as to the

25. Albright, F., and Bloomberg, E.: Tr. Am. A. Genito-Urin. Surgeons **27**: 195, 1934.

absorption of large quantities of vitamin D, and yet no healing of the rickets occurred. In the light of this experience, the failure to respond to ultraviolet radiation also suggests an intrinsic resistance to the specific agent. On the other hand, sufficiently large doses of the vitamin by mouth did produce healing. Therefore, the intrinsic factor which prevented the usual response to vitamin D could be overcome when large enough amounts were given. This patient's condition, then, is an example of a type of rickets of as yet unknown etiology which is not the result of a deficiency of the ordinary order of magnitude of vitamin D or ultraviolet light but which is due to an intrinsic resistance to the antirachitic action of vitamin D.

SUMMARY AND CONCLUSIONS

The case of a boy of 16 who had suffered from rickets since the age of 1 year in spite of treatment with vitamin D is reported.

Histologic evidence demonstrating that the condition was true rickets and not some other condition resembling rickets is presented.

Metabolic data are present to show that the changes in the calcium and phosphorus metabolism were similar to those in ordinary infantile rickets.

Evidence is presented to show that the cause of the disorder was not a primary hyperparathyroidism, though a secondary hyperparathyroidism was present and was probably the cause of the hypophosphotemia.

The resistance to vitamin D therapy was not due to failure to absorb vitamin D, since crystalline vitamin D injected intravenously and radiation from an ultraviolet ray lamp were ineffective.

With massive doses of vitamin D, such as from 150,000 to 1,500,000 U. S. P. units daily by mouth (from 15 to 150 cc. of viosterol or from 15 to 30 cc. of crystalline vitamin D in propylene glycol), the disorder of metabolism was corrected and healing of the rickets took place.

Evidence is presented which suggests the necessity of observing the patient carefully lest, with the healing of the rickets, too large doses of vitamin D produce hypervitaminosis.

Attention is called to the fact that the disturbance in this patient cannot be considered a deficiency disease like ordinary rickets. It is rather a form of rickets due to an intrinsic resistance to the antirachitic action of vitamin D. This resistance, however, can be broken down with massive doses.

EFFECT OF CITRATE AND TARTRATE ON EXPERIMENTAL RICKETS

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Studies in the laboratory of the Department of Pediatrics of the University of Chicago have shown that citric and tartaric acids and the sodium salts of these acids have a marked tendency to prevent the development of rickets in rats on a rachitogenic diet and to cause healing when administered to rachitic animals. Incorporated in the rachitogenic diet in sufficient amounts, sodium citrate, sodium tartrate and sodium bitartrate furnished protection against the development of rickets. When equivalent quantities of the acids and salts were fed, it was found that the salts were slightly more effective than the corresponding acids.

When animals were placed on a rachitogenic diet until severe rickets developed and the acids or the salts were then administered along with the diet for periods of five or ten days, marked healing was evident.

METHOD

The acids or salts which were to be tested for their antirachitic effect were thoroughly mixed with the McCollum diet 3143 [1] in amounts of either 0.4 or 0.8 mol to 1 Kg. of diet. Owing to the high acidity, the acids could not be fed in concentrations greater than 0.4 mol to 1 Kg. of diet. Generally, three groups of animals were used at the same time, and one of them was always a control group on the rachitogenic diet alone. This plan was followed so that the effects of seasonal and other variations in the development of the rickets would be eliminated. The rats were placed on the diets when they were from 21 to 24 days of age, at which time they weighed approximately 45 Gm. each. They were kept in metabolism cages in a darkened room and allowed free access to food and to water at all times. No difficulty was experienced in inducing the rats to eat the food, but those on a diet containing a high percentage of salts consumed considerably more water than those on the control diet.

Three weeks after the animals were put on the diets and again at the end of six weeks, roentgenograms were taken of one foreleg of each rat. In every case the roentgenograms taken at the end of the three week period showed the effect of

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From the Department of Pediatrics, University of Chicago.

1. McCollum, E. V.; Simmonds, N.; Shipley, P. G., and Park, E. A.: Studies on Experimental Rickets: VIII. The Production of Rickets by Diets Low in Phosphorus and Fat-Soluble A, J. Biol. Chem. **47**:507-527 (Aug.) 1921.

the acids or salts, but after six weeks a greater difference was usually noticeable between the control animals and those on the experimental diet. Therefore, the six week period was used in judging the effect of the added acid or salt.

When roentgenograms are used to diagnose rickets, the width of the epiphysial space is the chief sign by which the severity of the disease is judged, and the degree of rickets is generally indicated by one or more plus signs. It is customary to make a visual comparison of the roentgenograms, depending on the memory in distinguishing between the different degrees of rickets. Such a comparison must contain many inaccuracies. In order that these inaccuracies might be avoided as far as possible, a method by which the width of the epiphysial space can be measured and the measurements compared was worked out and used in this study.

The measurements were made as follows: The film was placed against an illuminated background, and two parallel lines were drawn lightly at the point of greatest width of the epiphysial space. This was easily done with a ruler and a dissecting needle. In drawing the lines, one must take care to depress but not to scratch the emulsion. The thickness of the lines so drawn is about 0.06 mm. The distance between the lines was then measured under the microscope at about 10 times magnification, a micrometer disk being used in the eyepiece.

There are, of course, a number of errors involved in this method, errors connected both with the taking of the roentgenograms and with the actual measurement. In order that the magnitude of these errors when different degrees of rickets were present might be estimated, three series of roentgenograms were taken, one of a normal rat, one of a rat with moderate rickets and one of a rat with severe rickets. In each series twenty-four roentgenograms were taken of the same foreleg of the rat. So that the position would not be the same each time, the rat was released after each exposure. The mean width of the epiphysial space in the foreleg of the normal rat was 0.11 mm., and the standard deviation of the twenty-four measurements was 0.04 mm. (36 per cent). It should be pointed out that the narrow epiphysial space of the normal animal is difficult to measure and that the measurements increase in accuracy when the space is over 0.20 mm. This is shown by the measurements on the rachitic rats. For the animal with moderate rickets the mean width of the epiphysial space was 0.61 mm., with a standard deviation of 0.13 mm. (21 per cent). For the animal with severe rickets the mean width of the epiphysial space was 1.14 mm., with a standard deviation of 0.20 mm. (18 per cent). It may be roughly estimated that with this degree of error one could distinguish between five degrees of rickets if only one animal were available in each group. If, as in the present work, twenty or more animals are used in each group, much finer distinctions may be made.

RESULTS

The results of the experiments in which tartaric and citric[2] acids and their salts were fed are summarized in table 1, and for comparison the results with a group of animals on the same rachitogenic diet plus 2 per cent of cod liver oil is included. Animals in which the epiphysial space was 0.20 mm. or less were considered normal. The animals on

2. After hearing our preliminary report on the results obtained with tartrate (Hamilton, B., and Schwartz, C.: Rôle of Acidosis and Alkalosis in the Etiology of Rickets, Am. J. Dis. Child. **46**:669 [Sept.] 1933), Dr. Alfred T. Shohl tested the antirachitic effect of citrate and suggested its use to us.

diets containing 0.8 mol of sodium bitartrate or sodium tartrate and those on diets containing 0.4 or 0.8 mol of sodium citrate were free from rickets, as shown by the figures 0.13 mm., 0.16 mm., 0.18 mm. and 0.10 mm., respectively, for the mean width of the epiphysial space. When 0.4 mol of the tartrate salts was fed, mild rickets developed in several of the animals, as indicated by the wider epiphysial space for these groups, 0.28 mm. and 0.24 mm.[3] The figures 0.31 mm. for the width of the epiphysial space for the animals receiving tartaric acid and 0.23 mm. for those receiving citric acid indicate that the acids, while having considerable preventive action, were less effective than their salts. Citric acid and sodium citrate seem to be slightly more effective than the tartrates. The control animals acquired severe rickets, and in these the mean width of the epiphysial space was 1.19 mm. for

TABLE 1.—*Antirachitic Effect of Citric and Tartaric Acids and Their Sodium Salts*

Substance Added to 1 Kg. of Rachitogenic Diet (McCollum Diet 3143)	Mean Width of Epiphysial Space, Mm.*	Standard Deviation	Number of Rats	Serum Phosphorus, Mg. per 100 Cc. (Average for Group)
Cod liver oil, 2%	0.14	0.06	29	4.6
Nothing added	1.19	0.46	93	2.7
Sodium tartrate, 0.8 mol	0.16	0.08	46	3.4
Sodium bitartrate, 0.8 mol	0.13	0.08	44	4.2
Sodium tartrate, 0.4 mol	0.24	0.11	35	3.3
Sodium bitartrate, 0.4 mol	0.28	0.10	36	3.5
Tartaric acid, 0.4 mol	0.31	0.17	43	3.6
Nothing added	1.34	0.32	27	2.2
Sodium citrate, 0.8 mol	0.10	0.06	22	4.3
Sodium citrate, 0.4 mol	0.18	0.08	20	5.2
Citric acid, 0.4 mol	0.23	0.11	40	4.2

* This is a measurement of the degree of rickets. Animals in which the epiphysial space was 0.20 mm. or less were considered normal. Measurements were made after six weeks on the diets.

one group and 1.34 mm. for the other. Two groups on a rachitogenic diet were included, since the experiments with tartrate and those with citrate were made several months apart.

One or two days after the last roentgenogram was taken, the animals were bled by heart puncture, and the levels of the phosphate, calcium and bicarbonate in the serum were determined for the pooled blood of each group. There was nothing significant in the figures for serum calcium or bicarbonate. All the groups, including those on the diet containing cod liver oil, showed lower values for serum phosphate than do normal animals of the same age. Values of from 6 to 8 mg. of phosphorus per hundred cubic centimeters of serum are usually found

3. When the statement is made that one value is different from another, this statement is always based on a statistical analysis of the figures. It means that the probability that the two values are not different is less than 0.05.

for animals on a balanced stock diet.[4] There was no correlation between the degree of rickets as judged by the roentgenograms and the values for serum phosphorus.

There was no significant difference in growth between the rats on the diets containing the acids and those on the diets containing the salts. In every case growth was less than it is in animals on a well

A shows the foreleg of an animal on a rachitogenic diet; *B*, the foreleg of an animal on a rachitogenic diet with 0.4 mol of sodium citrate per kilogram of diet. Both animals had been on the diet for six weeks.

balanced diet but was equal to or better than the growth of the rats on the rachitogenic diet containing 2 per cent of cod liver oil.

4. A slightly modified Bills diet is used in this laboratory (Bills, C. E.; Honeywell, E. M.; Wirick, A. M., and Nussmeir, M.: A Critique of the Line Test for Vitamin D, J. Biol. Chem. **90**:619-636 [Feb.] 1931).

HEALING

The animals were placed on the rachitogenic diet for three weeks. In this time severe rickets developed, as shown by roentgenograms. The acid or salt to be tested was then incorporated in the rachitogenic diet in the proportion of 0.4 mol to each kilogram of diet, and this was supplied ad libitum for five or ten days, after which a second roentgenogram was taken. A control group was kept on the rachitogenic diet, and roentgenograms were taken of the rats in this group at the same intervals so that any spontaneous healing would be detected. Immediately after the last roentgenogram of each group had been taken, the animals were bled and the blood was pooled for determination of

TABLE 2.—*Healing Produced by Treatment with Acids and Salts*

Substance Added to 1 Kg. of Rachitogenic Diet (McCollum Diet 3143)	Days of Treatment	Number of Rats Used	Serum Phosphorus, Mg. per 100 Cc.	Degree of Healing Shown by Line Test*
Nothing added	..	17	2.7	0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 1, 2, 2
Citric acid, 0.4 mol	5	6	2.3	3, 3, 4, 4, 4, 4
	10	6	4.5	3, 4, 4, 4, 4, 4
Sodium citrate, 0.4 mol	5	6	4.0	2, 3, 4, 4, 4, 4
	10	6	5.0	4, 4, 4, 4, 4, 4
Tartaric acid, 0.4 mol	5	6	2.2	3, 3, 4, 4, 4, 4
	10	6	6.6	3, 3, 3, 4, 4, 4
Sodium bitartrate, 0.4 mol	5	6	2.8	2, 3, 4, 4, 4, 4
	10	6	3.2	4, 4, 4, 4, 4, 4
Sodium tartrate, 0.4 mol	5	6	2.5	1, 2, 2, 3, 4, 4
	10	6	3.4	4, 4, 4, 4, 4, 4

* The figures indicate the degree of healing usually expressed by plus signs; e. g., 1 indicates + and 2 indicates ++.

the serum phosphorus content. They were then killed, and the hindlegs were removed and placed in a solution of formaldehyde for the line test.[5]

Table 2 shows the degree of healing produced by the acids and by the salts. There was definite evidence of healing in every group after five days of treatment with the acids or salts. At the end of ten days most of the animals showed 4 plus healing. There was good agreement between the degree of healing shown in the roentgenograms and that shown by the line test, and the serum phosphorus content of the animals killed after ten days was slightly higher than that of those killed after five days.

5. McCollum, E. V.; Simmonds, N.; Shipley, P. C., and Park, E. A.: Studies on Experimental Rickets: XVI. A Delicate Biological Test for Calcium-Depositing Substances, J. Biol. Chem. **51**:41-49 (March) 1922.

It might be mentioned that Chaney and Blunt [6] found that large quantities of orange juice had a decidedly beneficial effect on the calcium and phosphorus retention in growing girls. They stated that the orange juice they used contained 0.98 per cent of citric acid and that from 600 to 700 cc. was given daily. This is about 6 Gm. of citric acid per day.

COMMENT

The production of experimental rickets by a diet high in calcium, low in phosphorus and deficient in vitamin D has been explained on the theory that the high concentration of calcium in the intestinal tract causes the precipitation of most of the phosphorus present and thus prevents its absorption.[7] Recent work on beryllium rickets is in accord with this theory.[8] If this is correct, factors which tend to prevent the precipitation of phosphate should also prevent the development of rickets. One or more factors might operate independently or together to bring about this result.

The beneficial effect of the citrate and tartrate is probably exerted largely in the intestinal tract and is possibly due to a decrease in available calcium. A change in the concentration of the calcium ion in the intestinal contents might be brought about in a number of different ways. The formation of slightly soluble calcium compounds other than calcium phosphate would result in a decrease in the number of calcium ions and thus lessen the tendency to precipitation of phosphate. Chiari [9] found that the administration of sodium tartrate to cats reduced the amount of soluble calcium in the intestine and concluded that the calcium was precipitated by the tartrate. The formation of a soluble calcium complex which did not react with phosphate would have a similar effect. Shear and Kramer [10] and Shear, Kramer and Resnikoff [11] showed that a solution of sodium citrate added to a solution containing calcium ions removes the calcium ions from the solution

6. Chaney, M. S., and Blunt, K.: The Effect of Orange Juice on the Calcium, Phosphorus, Magnesium and Nitrogen Retention and Urinary Organic Acids of Growing Children, J. Biol. Chem. **66**:829-845, 1925.

7. Orr, W. J.; Holt, L. E.; Wilkins, L., and Boone, F. H.: The Relation of Calcium and Phosphorus in the Diet to the Absorption of These Elements from the Intestine, Am. J. Dis. Child. **28**:574-581 (Nov.) 1924.

8. Guyatt, B. L.; Kay, H. D., and Branion, H. D.: Beryllium "Rickets," J. Nutrition **6**:313-324 (July) 1933.

9. Chiari, R.: Abführmittel und Kalkgehalt des Darmes, Arch. f. exper. Path. u. Pharmakol. **63**:434-440 (Oct.) 1910.

10. Shear, M. J., and Kramer, B.: Composition of Bone: V. Some Properties of Calcium Citrate, J. Biol. Chem. **79**:161-175 (Sept.) 1928.

11. Shear, M. J.; Kramer, B., and Resnikoff, L.: Composition of Bone: VIII. Conductivity Titrations of Calcium Ion with Chloride, Acetate, Lactate and Citrate Ions at 38°, J. Biol. Chem. **83**:721-735 (Sept.) 1929.

and that the calcium ions are bound by the citrate ions in some kind of soluble, slightly ionized complex, the exact nature of which is unknown.

The effect of the acids and salts might also be due to a change in the hydrogen ion concentration of the gastro-intestinal contents which would increase the solubility of the calcium phosphate compounds and thus the availability of the phosphate. Telfer,[12] Steenbock and his co-workers,[13] Irving[14] and others have suggested that absorption of calcium salts is dependent on the acidity of the intestinal contents. Acids and acid salts should therefore be beneficial.

In considering solubility, the influence of one salt on the solubility of another cannot be overlooked, but in a medium as complex as the contents of the gastro-intestinal tract, it is impossible to predict what this influence might be.

It is of interest that the antirachitic effect of the citrate and the tartrate was not obtained when calcium citrate and calcium tartrate were fed. Diets were prepared in which the calcium carbonate present in the McCollum diet 3143 was replaced by an equivalent quantity of calcium

TABLE 3.—*Lack of Antirachitic Effect of Calcium Citrate and Calcium Tartrate*

Diet	Mean Width of Epiphysial Space, Mm.*	Standard Deviation	Number of Rats Used
Rachitogenic, with calcium in the form of calcium carbonate	1.13	0.28	29
Rachitogenic, with calcium in the form of calcium citrate....	0.89	0.27	23
Rachitogenic, with calcium in the form of calcium tartrate..	0.98	0.20	22

* Measurements made after the animals were on the diet three weeks.

in the form of calcium citrate and calcium tartrate. These diets produced rickets which was almost as severe as that produced by the diet containing calcium carbonate. The experimental results are shown in table 3. However, the chemical composition of the contents of the gastro-intestinal tract when these diets were fed would be different from that produced by the diets containing the acids and the sodium salts. In one case, highly soluble acids and salts were fed along with the much less soluble calcium carbonate, and it is probable that at all times the concentration of citrate and tartrate ions was in excess of the concentration of calcium ions. When calcium citrate and calcium tartrate were fed, the calcium ion concentration was equivalent to the citrate

12. Telfer, S. V.: Studies on Calcium and Phosphorus Metabolism: III. The Absorption of Calcium and Phosphorus and Their Fixation in the Skeleton, Quart. J. Med. **17**:245-259 (April) 1923.

13. Steenbock, H.; Hart, E. B.; Sell, M. T., and Jones, J. H.: The Availability of Calcium Salts, J. Biol. Chem. **56**:375-386 (June) 1923.

14. Irving, L.: The Relation of Solubility to the Absorption of Calcium Salts from the Intestine, J. Biol. Chem. **68**:513-520 (June) 1926.

or tartrate ion concentration. Also, the acids and the sodium salts would probably produce different hydrogen ion concentrations in the contents of the gastro-intestinal tract from that produced by calcium citrate or calcium tartrate.

Another factor which is thought to be of importance in rickets is the acid-base metabolism of the body. The literature contains a number of seemingly conflicting reports as to the effect of acids and alkalis on the development of experimental rickets. Samuel and Kugelmass [15] found that in an animal on a diet with an acid ash a more severe rickets developed than developed in an animal on a diet with an alkaline ash. Similar results were reported by Shelling.[16] Zucker, Johnson and Barnett [17] used a rachitogenic diet with an alkaline ash and with calcium in the form of lactate. They found that a milder type of rickets developed if the calcium lactate was replaced by calcium chloride. This finding seems to be in direct conflict with those just cited, because in the body, calcium chloride acts as a salt with an acid ash, calcium being absorbed in much smaller amounts than the chloride.[18] Results similar to those obtained by Zucker and his associates were reported by Hess and his co-workers.[19] They fed a diet with an alkaline ash and an unusually high calcium phosphorus ratio and found that the rickets produced by this diet was unaffected by antirachitic agents unless calcium chloride was used in the diet in place of calcium carbonate.

These seemingly conflicting results may perhaps be explained if it is assumed that an acid reaction in the intestinal tract is a beneficial thing, tending to prevent the development of rickets by furthering the absorption of calcium and phosphorus, while acidosis in the internal metabolism might have the opposite effects, promoting the development of rickets by hindering the formation of bone. Conversely, an alkaline reaction in the intestinal tract might promote the development of rickets by hindering the absorption of calcium and phosphorus, while alkalosis in the internal metabolism might promote the formation of bone. If

15. Samuel, E. L., and Kugelmass, I. N.: Comparative Studies of the Influence of Acid-Forming and Base-Forming Diets on the Metabolism of Rats, Am. J. Dis. Child. **39**:687-700 (April) 1930.

16. Shelling, D. R.: The Production of Rickets in Rats by Changes in Acid-Base Ratio of the Diet, Thesis, Yale University Press, 1925; cited by Samuel and Kugelmass.[15]

17. Zucker, T. F.; Johnson, W. C., and Barnett, M.: The Acid-Base Ratio of the Diet in Rickets Production, Proc. Soc. Exper. Biol. & Med. **20**:20-22, 1922.

18. Gamble, J. L.; Ross, G. S., and Tisdall, F. F.: Studies on Tetany: I. The Effect of Calcium Chloride Ingestion on the Acid-Base Metabolism of Infants, Am. J. Dis. Child. **25**:455-469 (June) 1923.

19. Hess, A. F.; Weinstock, M.; Rivkin, H., and Gross, J.: Observations Suggesting a Local Factor in Pathogenesis and Healing of Rickets, Proc. Soc. Exper. Biol. & Med. **27**:140-142, 1929.

this were true, then an acid or a salt might have either a beneficial or a harmful effect, depending on the diet with which it was given. It was our original intention to test this theory by feeding salts which might increase the acidity of the intestinal contents and at the same time cause some degree of alkalosis in the metabolism. Sodium bitartrate is theoretically a salt of this type, and the experiments showed that it does have a marked antirachitic effect. The antirachitic effect of the acids might also be explained this way. They increase intestinal acidity and if completely oxidized in the body would have no effect on the acid-base metabolism. However, they were added to a diet with an alkaline ash, so that the ultimate effect of the combination should be an acid reaction in the intestines and alkalosis in metabolism. The theory, however, does not explain the antirachitic effect of sodium citrate and sodium tartrate.

All of the factors discussed probably entered into the results obtained in these experiments. The high concentration of citrate or tartrate ions should remove much of the calcium as insoluble citrate or tartrate or, perhaps, as a soluble calcium complex. Citric and tartaric acids and sodium bitartrate should increase the hydrogen ion concentration of the gastro-intestinal contents and thus the solubility of the calcium phosphate compounds. There may also be some effect on the acid-base metabolism of the body.

SUMMARY

When sodium citrate was added to a rachitogenic diet in the proportion of 0.4 mol to each kilogram of diet, it prevented the development of rickets in rats. Sodium tartrate and sodium bitartrate in the proportion of 0.8 mol to each kilogram of diet had a similar effect. Citric and tartaric acids also had an antirachitic effect, although it was less marked than that of the sodium salts. The acids and the salts caused healing when administered to rachitic animals. The degree of rickets was determined by measuring the width of the epiphysial space on roentgenograms.

Case Reports

PAROXYSMAL ATRIOVENTRICULAR NODAL TACHYCARDIA IN A NEW-BORN INFANT

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The purpose of this paper is to present an unusual example of cardiac arrhythmia in a new-born infant and to discuss briefly the therapy administered in cases of this disorder.

Paroxysmal tachycardia in children is rare, as is evident from the paucity of reports in the literature. A complete review of the literature of forty-three years (1892 to 1935) reveals a total of fifty-two cases of paroxysmal tachycardia in children between the ages of 4 days and 15 years (table). A review of these fifty-two cases brings into relief the following observations:

1. There is no significant predilection as to age.
2. Boys and girls are about equally represented.
3. The predisposing factors are extremely variable. The incidence of congenital heart disease is high. Of the infectious diseases, measles and pertussis are in the lead as causative agents.
4. The symptomatology is variable. Dyspnea, cyanosis and cardiac dilatation are the most frequent symptoms and appear to be ominous.
5. Arrhythmia of auricular origin is more common than that of nodal or ventricular origin.
6. The prognosis seems to depend on the etiology rather than on the type of arrhythmia.

Of the paroxysmal forms of tachycardia, the atrioventricular nodal type is the rarest. White and Sprague reported four instances of this type in 10,000 patients whose electrocardiograms were recorded at the Massachusetts General Hospital during sixteen years. Willius and Barnes recorded three cases at the Mayo Clinic in nine years. In three of the fifty-two cases of paroxysmal tachycardia in children reported in the literature the condition was definitely diagnosed as of nodal origin.

Sutherland's patient was a boy 7½ years of age who had episodes of tachycardia, with a heart rate of 200 per minute. These episodes

Author	Year	Age of Patient	Sex of Patient	Predisposing Factors	Heart Rate	Symptoms	Graphic Study	Type of Tachycardia	Result
Buckland	1892	5 yr.	F	Measles, neurotic symptoms	200-215	Pallor, dyspnea, vertigo	.....	.....	Recovered
Herringham	1898	5 yr.	F	Scarlet fever, tonsillitis	200-256	Cyanosis, enlargement of the liver	.....	.....	Recovered
Hoffman	1900	2 yr.	?	Congenital heart disease	?	Cyanosis	.....	.....	Died
Merklen	1901	?	F	.....	220	Dyspnea, cardiac dilatation, hemoptysis	.....	.....	.....
Hay	1907	6 yr.	M	Delicate constitution	182-230	Pulmonary edema, cardiac dilatation, hemoptysis	Polygram	Paroxysmal auricular tachycardia	Recovered
Kuré	1912	8 yr.	F	Psychic condition	186	Dyspnea, palpitation	Polygram	.....	Recovered
Hume	1913	7 yr.	F	Diphtheria	225	Collapse, cardiac dilatation	Polygram	Auricular flutter	Died
Hume	1913	5 yr.	M	Diphtheria	132	Cardiac dilatation	Polygram	Auricular flutter	Died
Kidd	1914	2 yr.	M	Measles	240	Dyspnea, cardiac dilatation, anasarca	.....	.....	Died
Hutchinson and Parkinson	1914	2 yr.	M	.....	160-245	Cardiac dilatation, enlargement of the liver	Polygram, electrocardiogram	Nodal tachycardia ?	Recovered
Sutherland	1914	7 yr.	M	.....	200	Cardiac dilatation, decompensation	Electrocardiogram, polygram	Nodal tachycardia	Recovered
Lewis	1915	3 mo.	?	.....	270-290	.....	Electrocardiogram	Nodal tachycardia ?	.....
Hart	1917	9 yr.	F	.....	.....	.....	Electrocardiogram	Paroxysmal auricular tachycardia	Recovered
Brown	1917	1 yr.	M	Malnutrition	180-200	Pallor, jugular pulse	Electrocardiogram	Paroxysmal auricular tachycardia, nodal tachycardia ?	Recovered
Koplik	1917	22 mo.	M	Bronchitis	224-280	Cyanosis, dyspnea, edema, enlargement of the liver	Electrocardiogram	Paroxysmal auricular tachycardia	Recovered
Koplik	1917	10 yr.	M	Measles	.....	Palpitation	Electrocardiogram	Auricular flutter	Recovered
Koplik	1917	3 yr.	F	.....	228	None	Electrocardiogram	Nodal tachycardia	Recovered
Cassidy	1924	8 yr.	M	Rheumatic pains	200-210	.....	Electrocardiogram	Paroxysmal auricular tachycardia	Recovered?
Schuster and Paterson	1924	8 wk.	?	Patent ductus, foramen ovale, patent intraventricular septum	200	Cyanosis, dyspnea, enlargement of the liver, cardiac dilatation	.....	.....	Died
O'Flynn	1925	8 mo.	F	None	200-300	Enlargement of the liver, Cheyne-Stokes respiration	....	.....	Recovered
Werley	1925	4 days	M	Patent ductus	307	Cyanosis, enlargement of the liver	Polygram	.....	Died
Colgate and McCulloch	1926	24 days	M	Prematurity	291	Enlargement of the liver, rapid respiration	Electrocardiogram	Paroxysmal auricular tachycardia, nodal tachycardia ?	Recovered
Colgate and McCulloch	1926	3 wk.	M	None	220-250	Cyanosis	Electrocardiogram	Paroxysmal auricular tachycardia	Recovered
Poynton and Wyllie	1926	4 mo.	M	Trauma during pregnancy	250	Cyanosis	Electrocardiogram	Auricular flutter	Recovered
Dressler and Löwy	1926	2 yr.	M	Infection of the upper part of the respiratory tract	250	Decompensation	Electrocardiogram	Auricular flutter	Recovered
Amberg and Willius	1926	2 yr.	M	Congenital heart	315-350	Dyspnea, swelling of	Electrocardiogram	Auricular flutter	Died

Poynton and Wyllie	1926	4 mo.	M	Trauma during pregnancy	250	Cyanosis	Electrocardiogram	Auricular flutter tachycardia	Recovered
Dressler and Löwy	1926	2 yr.	M	Infection of the upper part of the respiratory tract	250	Decompensation	Electrocardiogram	Auricular flutter	Recovered
Amberg and Willius	1926	2 yr.	M	Congenital heart disease	315-350	Dyspnea, swelling of the abdomen	Electrocardiogram	Auricular flutter	Died
Faerber	1926	4 yr.	F	Congenital heart disease	.....	Cardiac dilatation, enlargement of the liver, collapse	Electrocardiogram	Partial heart block, extrasystole	?
Faerber	1926	13 yr.	M	Congenital heart disease	.....	Cardiac dilatation, enlargement of the liver, collapse	Electrocardiogram	Partial heart block, extrasystole	?
Russell and Ellison	1927	4 mo.	..	Congenital heart disease	300	Cyanosis	Electrocardiogram	Paroxysmal auricular tachycardia	Recovered
Franke and Weiner	1928	10 yr.	M	Pertussis, positive Wassermann reaction	250	None	Electrocardiogram	Paroxysmal auricular tachycardia, nodal tachycardia ?	Recovered
Franke and Weiner	1928	11 yr.	F	Rheumatic endocarditis	250	Embolism	Electrocardiogram	Paroxysmal ventricular tachycardia	Recovered
Willius and Amberg	1929	7 yr.	F	Pertussis	156	Cerebral symptoms	Electrocardiogram	Nodal tachycardia	Recovered
O'Donovan	1929	5 yr.	M	Diphtheria	Auricular 330, ventricular 165	Cardiac dilatation, albuminuria	Electrocardiogram	Auricular flutter	Recovered
von Bernuth	1929	15 yr.	M	Progressive muscular dystrophy	160	Palpitation	Electrocardiogram	Paroxysmal ventricular tachycardia	?
von Bernuth	1929	9 yr.	F	Pertussis, measles, arthritis following scarlet fever	180	Palpitation	.....	.....	Recovered
von Bernuth	1929	12 yr.	F	Phrenic excision for bronchiectasis	180-200	Dyspnea, palpitation	.....	.....	Recovered
von Bernuth and von den Steinen	1930	3 wk.	M	Encephalitis	180-200	Cyanosis	Electrocardiogram	Paroxysmal auricular tachycardia	Died
von Bernuth and von den Steinen	1930	2 mo.	M	Encephalitis	200	Cyanosis	.....	.....	Died
Essig	1930	10 yr.	M	Measles ?	230-260	Cyanosis, palpitation	Electrocardiogram	Paroxysmal auricular tachycardia	Recovered
Van Cleve	1930	7 mo.	F	High forceps delivery	200-250	Pallor, loss of consciousness	.....	.....	Recovered
Doxiades	1930	7 days	..	Thyrotoxicosis during pregnancy	240	Cyanosis, enlargement of the liver	Electrocardiogram	Paroxysmal auricular tachycardia	Recovered
de Bruin	1930	5 wk.	..	Encephalitis	280	None	Electrocardiogram	Paroxysmal auricular tachycardia	Recovered
Malossi	1931	6 yr.	..	Pertussis	240	Dyspnea, palpitation, enlargement of the liver	Electrocardiogram	Auricular flutter	Recovered
Malossi	1931	1 yr.	..	.....	260	.....	Electrocardiogram	Auricular flutter	Recovered
Carr and McClure	1931	New-born	F	Cesarean section	180-192	Dyspnea	Electrocardiogram	Auricular flutter	Recovered
Shookhoff and others	1932	8 yr.	M	Bronchopulmonary disease	225	Abdominal cramps, vomiting	Electrocardiogram	Auricular flutter	Recovered
Shookhoff and others	1932	3 yr.	F	Pertussis	270	Abdominal cramps, vomiting, enlargement of the liver	Electrocardiogram	Auricular flutter	Recovered
Shookhoff and others	1932	10 yr.	F	Mitral stenosis	164-182	Dyspnea, palpitation, fainting	Electrocardiogram	Paroxysmal auricular tachycardia	Recovered
Shookhoff and others	1932	3 yr.	F	Sore throat	246	Decompensation	Electrocardiogram	Paroxysmal auricular tachycardia	Died
Sherman and Schless	1934	1 mo.	M	.....	Auricular 464, ventricular 232	Cyanosis, syncope	Electrocardiogram	Auricular flutter	Recovered
Wegman and Egbert	?	10 mo.	..	Rhabdomyoma of the conduction system	.....	.....	.....	Auricular flutter	Died
Farr and Wegman	1935	24 days	M	None	300	Enlargement of the liver, dyspnea	Electrocardiogram	Auricular flutter	Recovered

lasted from ten hours to thirty-three days. For about two years each one was stopped by the induction of emesis with the aid of mild mercurous chloride. At the age of 9½ years the boy had an attack which this substance failed to relieve. Belladonna, bromides, cannabis, chloral hydrate and opium all failed to slow the heart rate. Three weeks after the inception of the attack the administration of digitalis was begun, but it had no effect until the thirty-third day of the paroxysm, when the heart rate slowed gradually. Several weeks later another attack began. After thirty days of tachycardia, with a heart rate of 200 beats per minute, signs of decompensation appeared. There were dyspnea while the patient was at rest, enlargement of the liver and edema of the ankles. Large doses of digitalis were administered without any definite effect on the cardiac rhythm. For nine weeks the heart rate continued to alternate between a normal rate and 200 per minute. When the administration of digitalis was discontinued, the paroxysms became more frequent. The child was given 45 minims (2.7 cc.) of tincture of digitalis daily and was sent to the seashore for convalescent care. The tachycardia gradually subsided, all signs of cardiac insufficiency disappeared and the child remained well.

Koplik reported a case of atrioventricular nodal tachycardia in a girl 3 years of age. The rate was from 240 to 250 per minute, and there were mild signs of decompensation. The patient was treated with digitalis without definite effects. Koplik concluded from the study of his case:

> Digitalis controls but does not cure the condition; on the contrary it is difficult to prevent a digitalis block. It would seem that the children are as well off without as with digitalis. The heart is very sensitive to this drug in these cases. It must be used with extreme caution. The interval use is to be rejected.

Willius and Amberg's patient was a girl 7 years of age. Cardiac arrhythmia developed shortly after an attack of pertussis. Several months later the child had several attacks of paroxysmal atrioventricular nodal tachycardia, each one associated with syncope. The child was given 65 mg. of quinine sulfate every four hours day and night. There was a cessation of the rapid rate. The rhythm, however, was a slow atrioventricular nodal rhythm. This rhythm lasted throughout the period of observation. When the administration of quinine was stopped the paroxysms returned. Five months later the child still had a slow nodal rhythm.

Three other cases have been reported in the literature which may have been cases of doubtful atrioventricular nodal tachycardia. Hutchinson and Parkinson reported a case in which a child 2¾ years of age had a cardiac rate of from 241 to 246. He had four attacks in four months. Each attack was stopped either by the induction of emesis or

by defecation. Colgate and McCulloch's patient was a Negro child born two weeks prematurely. When he was 24 days old dyspnea and disinclination to nurse were observed. The cardiac rate was found to be 300 per minute. The liver was enlarged. The electrocardiogram simulated that seen in cases of nodal tachycardia, although the P and the T wave were not always distinguishable. Ocular and carotid pressure failed to stop the paroxysm. Two hours after the child was admitted to the hospital the tachycardia ceased suddenly and was replaced by a normal sinus rhythm. Sir Thomas Lewis reported a similar case. He did not discuss the treatment.

REPORT OF A CASE

Gerard N., a white boy 7 days old, who was born on Feb. 28, 1935, was examined for a rapid heart rate at the Midwood Hospital in Brooklyn. He was a second-born twin. The brother was born spontaneously by vertex presentation, and the patient was delivered a few minutes later by version and extraction.

The mother was a tripara of 35 years. She had a normal pregnancy. She was admitted to the hospital on February 26 with a moderately severe chill and a temperature of 104 F. A few hours after admission the temperature dropped to normal, and it remained normal throughout the puerperium. She received several doses of methenamine and disodium hydrogen phosphate. On February 28 at 2:30 p. m. the membranes ruptured spontaneously, and two hours later the first baby was delivered, in the right occipitoposterior position. Three minutes later the second baby was delivered. No instruments were used in the deliveries.

An examination of the patient at birth was recorded by the house physician as revealing nothing abnormal. No cyanosis, dyspnea, icterus, cutaneous rash or convulsions were noted. No resuscitation was necessary.

During the first seven days after birth the child did well; he nursed well, had normal bowel movements, cried normally and did not differ in his behavior from the other babies in the nursery. On the eighth day the nurse reported a bloody stool. The child had a heart rate of from 250 to 300 per minute. He was slightly cyanosed. The respiratory rate was 62 per minute, and the temperature was normal.

Examination at this time revealed that the infant was well developed, well nourished and slightly cyanotic. The skin was clean and of good turgor. The eyes, ears, nose and throat were entirely normal. On percussion, the heart did not seem to be enlarged. The rate was 280 per minute; the sounds indicated good muscle tone, and no murmurs could be heard. The lungs were resonant throughout, and there were no râles. The abdomen was slightly distended; the liver was 1 fingerbreadth below the costal margin and was not pulsating. The umbilical stump was dry and clean. The genitals and the extremities were normal. There was no edema. The reflexes were normal, and there were no meningeal signs.

The electrocardiogram showed atrioventricular nodal tachycardia, with a rate of 250 per minute, and also right axis deviation. Electrocardiograms were taken of the mother, the brother and several other infants in the nursery. All the tracings were normal; those of the infants showed the typical right axis deviation, with a heart rate ranging between 136 and 150 (fig. 1).

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Vagal Effects (March 7).—Ocular pressure and pressure over the carotid sinus, as well as abdominal pressure and digital dilation of the anus, produced no effect on the heart rate.

Physostigmine Salicylate (March 7).—Physostigmine salicylate (1/300 grain, or 0.00021 Gm.) was injected intravenously into the longitudinal sinus. Five seconds after the administration of the drug there was a complete cardiac standstill. This pause lasted 10.28 seconds, after which the heart resumed its beat of nodal origin at the rate of 231 per minute. This rate continued for a little less than ten seconds. Then followed an abrupt slowing of the cardiac rate, but the rhythm

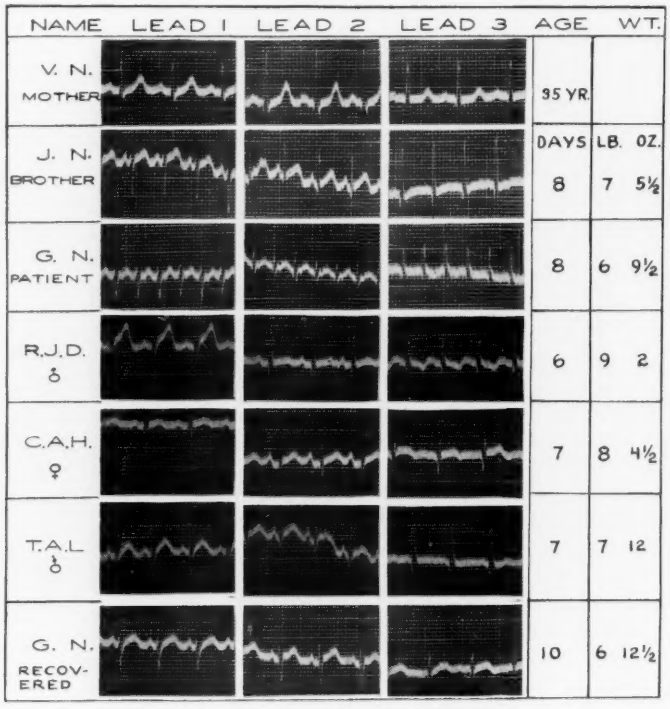

Fig. 1.—Portions of a series of tracings taken of the cardiac action of the mother and the brother of the patient and three other infants in the nursery.

was still nodal in origin. Occasionally a normal P wave was noted. The slowing of the heart rate did not, however, last longer than three minutes, and it was followed by nodal tachycardia, the rate being 250 per minute (fig. 2).

During this procedure no untoward effects—convulsions, excessive perspiration, pallor or increased cyanosis—were observed. We took cardiograms at short intervals for two hours after the administration of the drug but observed no change in the cardiac rate or rhythm.

During the twenty hours that followed there was no change in the general condition of the child. The heart rate was recorded every hour and ranged between 260 and 300 per minute. The child had six short attacks of cyanosis (fig. 3).

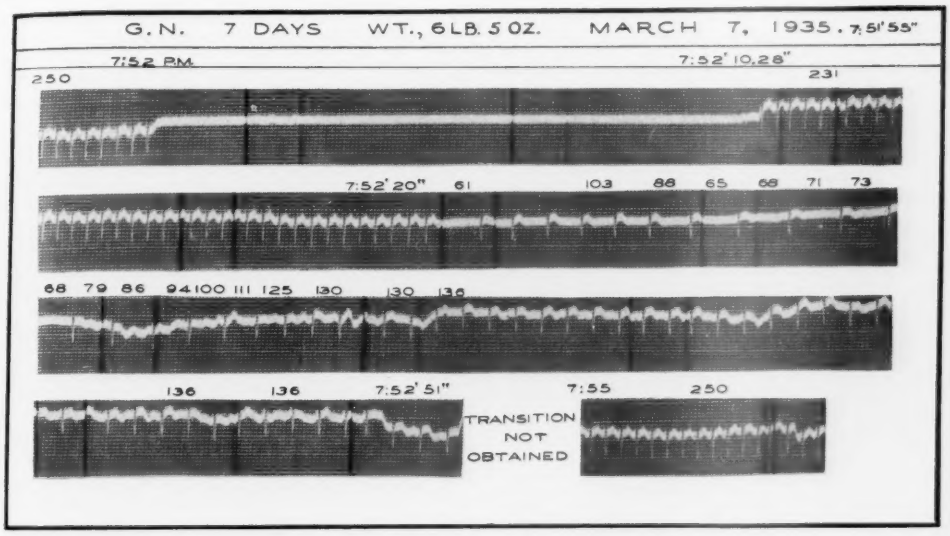

Fig. 2.—Electrocardiograms taken during the first period of therapy with physostigmine salicylate. The dose was 1/300 grain (0.00021 Gm.).

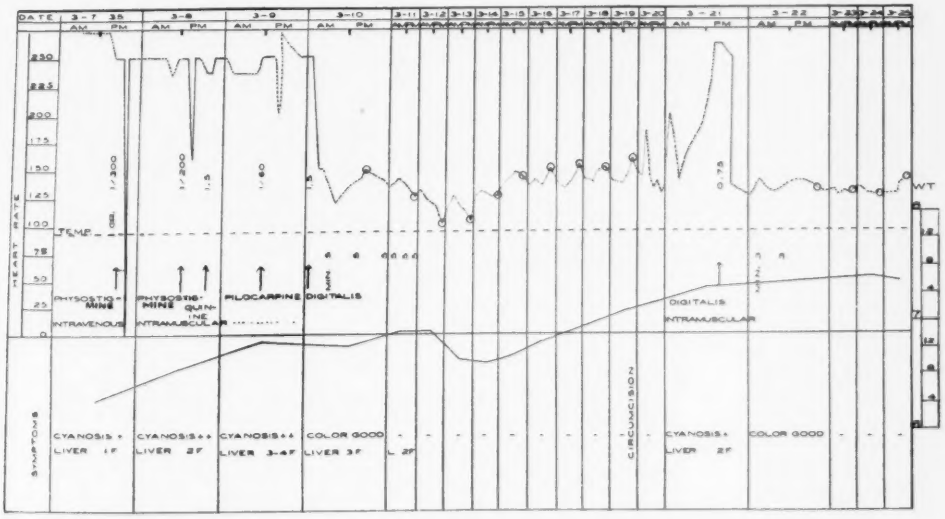

Fig. 3.—Chart representing the clinical course of the patient during the first nineteen days of observation. The upper curve represents the heart rate. The solid portions and the small circles represent the heart rate as recorded by the electrocardiograph, and the dotted portion, the heart rate as recorded every half-hour by stethoscope and with the aid of a stop-watch. The lower curve represents the weight.

At this time he seemed to be in some respiratory distress. The temperature was normal, the respiration 76 per minute and the heart rate 270 per minute. The liver was palpable 2 fingerbreadths below the costal margin, and the abdomen was considerably distended. We administered another dose of physostigmine salicylate (1/200 grain, or 0.00032 Gm.) intramuscularly. On this occasion there was again a transitory slowing of the heart rate, but the rhythm was normal. One extrasystole of ventricular origin was observed (fig. 4). About seven and a half minutes after the administration of the drug there was a sudden change in the appearance of the child. He became extremely pale and restless. The skin was cold and clammy. The respirations were shallow and irregular. He presented the appearance of an infant with circulatory collapse. The heart sounds were good. There were occasional moist râles at the bases of the lungs. The liver was 2½ fingerbreadths below the costal margin. The episode subsided in about fifteen minutes. There was no change in the child's condition for the rest of the day (fig. 3).

Quinine (March 8).—In the evening of March 8 quinine and urea hydrochloride (1½ grains, or 0.096 Gm.) was given intramuscularly, with no effect on the

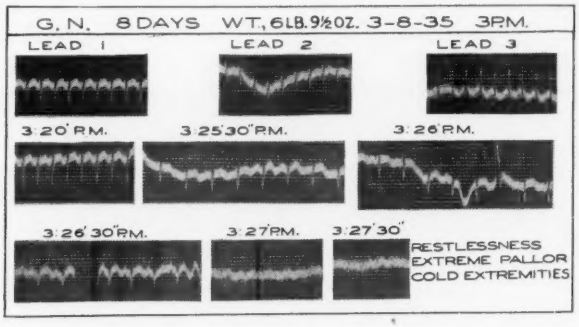

Fig. 4.—Electrocardiograms taken during the second period of therapy with physostigmine salicylate. The dose was 1/200 grain (0.00032 Gm.).

cardiac rate or rhythm. During the twenty-four hours that followed, signs of decompensation became more definite. There was considerable gain in weight. The cyanosis was more intense. The respirations were more rapid. There were moist râles at the bases of the lungs. The liver was palpable 4 fingerbreadths below the costal margin. There was slight edema of the ankles (fig. 3).

Pilocarpine Nitrate (March 9).—We administered pilocarpine nitrate (1/60 grain, or 0.001 Gm.) intramuscularly, without any effect. In the next few hours it became obvious that cardiac decompensation was increasing rapidly. On percussion, the heart showed enlargement to the left and the right. The sounds had lost their previous tone and were dull and distant. The rate was 300 per minute. Late in the evening dulness at the bases of the lungs was noted. The edge of the liver was felt in the pelvis and was definitely pulsating. There was livid cyanosis (fig. 3).

Digitalis (March 10, 12: 50 a. m.).—On March 10 at 12: 50 a. m., when the child was 10 days old, we administered intramuscularly 1 U. S. P. unit of digitalis in the form of digifoline. Electrocardiograms were taken at frequent intervals. At the end of about fifty minutes the heart assumed a normal sinus rhythm at a

rate of 180, which rapidly slowed to 150 (fig. 5). The general appearance of the child was definitely improved at the end of two hours. The cyanosis was displaced by pinkness. The respirations decreased to 50 per minute and became even. During that day the child received 5 minims (0.3 cc.) of digitalis on three occasions. The pulse rate ranged between 140 and 150. The administration of digitalis was continued orally for two days—10 minims (0.6 cc.) daily—and was discontinued on the third day, when the pulse rate dropped to 100 per minute. Three days after the intramuscular injection of digifoline the child lost 5 ounces (142 Gm.) in weight. The liver was just palpable; the lungs were clear. There was no dependent edema. On percussion, the heart seemed to have regained its normal dimensions (fig. 3).

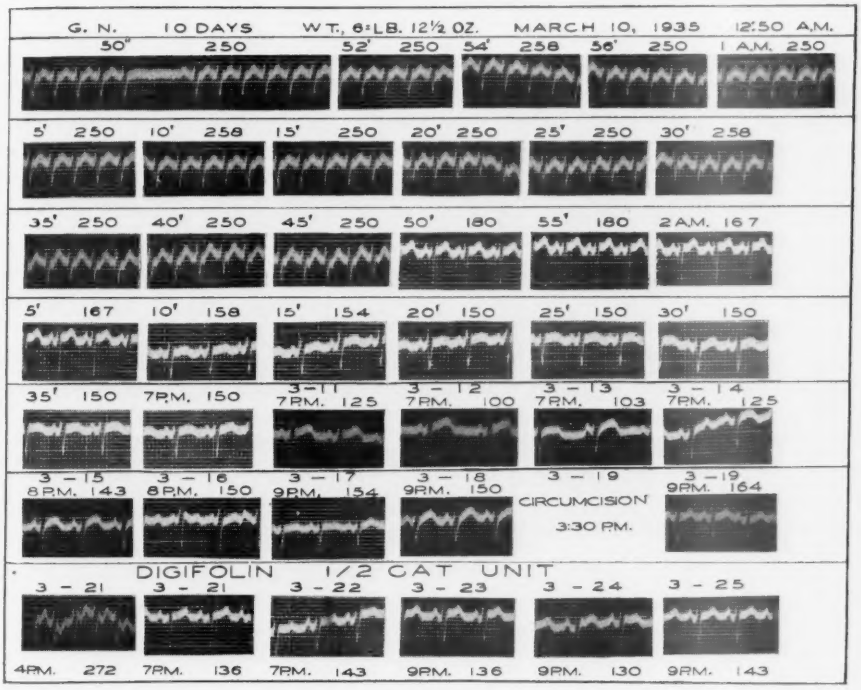

Fig. 5.—Sections of the electrocardiogram taken during the first period of therapy with digifoline, sections of daily electrocardiograms taken during the eight days following the administration of digifoline and sections of electrocardiograms taken before and after the circumcision and the administration of the second dose of digifoline.

For the next nine days the child did well. He took his feedings and gained weight at the rate of from 1½ to 3 ounces (from 42 to 85 Gm.) daily. Examination gave entirely negative results. Roentgenograms of the heart showed a normal silhouette. The blood findings were normal. There were 5,200,000 red cells, 100 per cent hemoglobin, 8,600 white cells, 38 polymorphonuclears, 59 lymphocytes, 3 eosinophils and 135,000 platelets. The coagulation time was five and one-half minutes and the bleeding time four minutes. The urine showed a faint trace of

albumin and an occasional pus cell. The electrocardiograms, one being taken daily, revealed a normal sinus rhythm, with a rate ranging between 110 and 115 per minute.

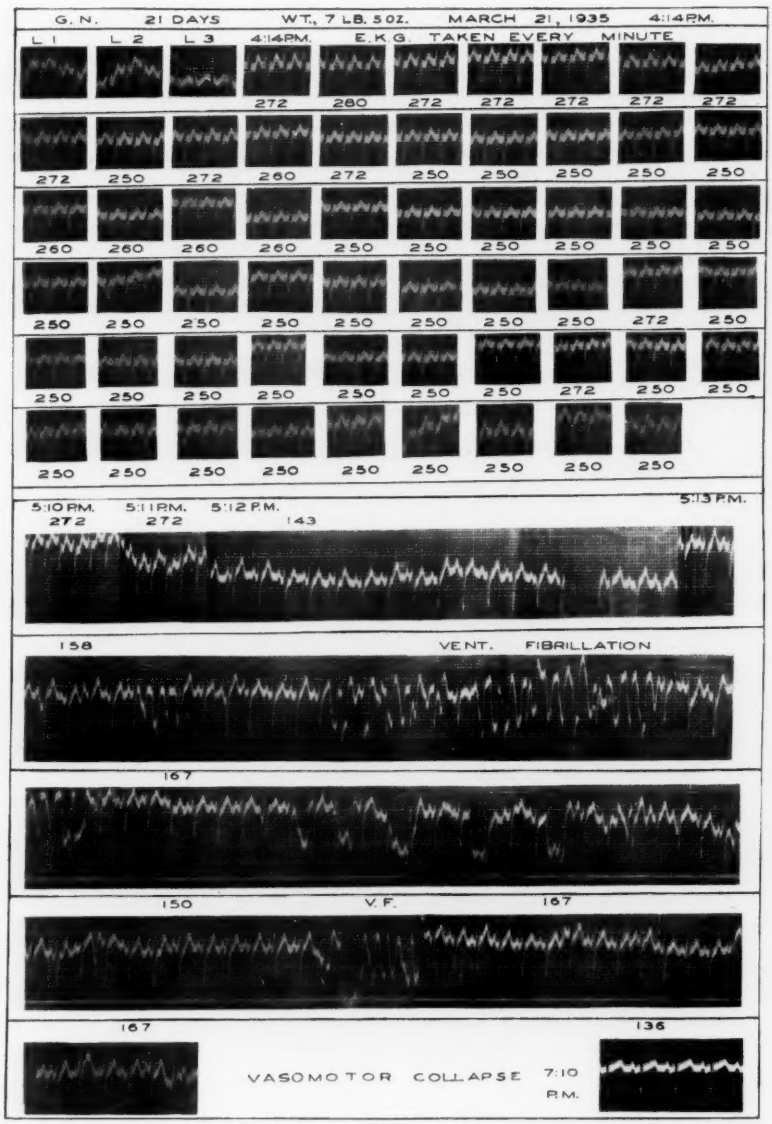

Fig. 6.—This series of electrocardiograms represents a more detailed study of the changes that took place after the second dose of digifoline. The episodes of ventricular fibrillation are well illustrated.

On March 19 at 3:30 p. m. the child was circumcised. There was no excessive bleeding. After the circumcision the heart rate was reported as 140 per minute.

Six hours later it was 164 and the rhythm was of sinus origin. The following day the child had several attacks of cyanosis, during which the heart rate was recorded as 190 per minute. On March 21 at 3 p. m. he had an attack of severe cyanosis, became very restless and had labored respiration. The heart rate was 240. The liver was 2 fingerbreadths below the costal margin. An electrocardiogram taken at 4 p. m. showed paroxysmal tachycardia of atrioventricular nodal origin, with a rate of 272 a minute (fig. 3).

Digitalis (March 21).—One-half U. S. P. unit of digifoline was given intramuscularly (fig. 6). There was no change in the heart rate and rhythm for fifty-seven minutes. At the end of this period there was an abrupt change in the heart rate. The general condition of the child, however, was poor. He was extremely pale and restless. The extremities were cold and clammy. Percussion of the borders of the heart revealed marked enlargement to the right and the left. The heart sounds were hardly audible; the pulse was imperceptible. The condition of the child was indeed critical. The electrodes were removed, and hot water bags were placed in the crib. Within twenty minutes the condition of the child improved. No stimulants were given.

The electrocardiograms taken during this episode revealed nodal tachycardia, with a rate of 272 at the time of the administration of digifoline. Fifty-seven minutes afterward there was an abrupt slowing of the heart rate to 143, with a change to a normal sinus rhythm. During the next few minutes two short periods of ventricular fibrillation occurred, followed by periods of regular sinus rhythm. Two hours after this episode the patient was entirely normal, both clinically and electrocardiographically (fig. 3).

We observed the child daily for one week, then weekly for several weeks and finally monthly for many months. No abnormalities were noted at any time either clinically or on the electrocardiograms. We last examined the child on Jan. 31, 1937, when he was 23 months of age. He was well developed and well nourished, weighed 31 pounds (14.1 Kg.) and was 34 inches (86.3 cm.) tall. He had walked at the age of 15 months and said the first few words at the age of 8 months. He had had no severe illnesses or attacks of cyanosis. In July 1936, when he was 1½ years of age, he had an attack of tonsillitis, with high fever and a convulsion. His twin brother had a similar infection at the same time, accompanied by several convulsions. Examination at this time revealed no abnormalities of the heart in size, shape, rate, rhythm or sounds.

COMMENT ON TREATMENT

White stated that three conditions are necessary for the establishment of atrioventricular nodal rhythm: (1) marked depression of the sinus node, (2) normal activity of the atrioventricular node and (3) ability of the impulse to pass backward from the junctional tissue with the auricles to cause their contraction, that is, an absence of a state of reversed block. In recent years one has learned to regard the possibility of simultaneous contraction of the auricles and the ventricles with less concern provided that the heart rate is slow. In cases of tachycardia of nodal origin, however, such an interference with ventricular filling may come into account. There is a real danger of a "stoppering effect." Therefore, the stopping of a paroxysm of atrioventricular nodal tachycardia is an urgent measure.

Auricular and nodal foci are apparently more under the control of the vagus than are ventricular foci. Wilson produced atrioventricular nodal rhythm in man by the administration of atropine and expressed the belief "that the special susceptibility of the heart toward atrioventricular nodal rhythm during the early action of atropine is due to selective action of the drug on the vagus terminations in the atrioventricular node in that it paralyzes these before it paralyzes those in the sinus node." Accordingly, vagus stimulation might be effective in relieving this type of tachycardia.

In the cases reported in the literature in which reflex stimulation of the vagus was attempted, no relief from the paroxysmal tachycardia was obtained. As early as 1912, Kaufman administered physostigmine to three adults suffering from atrioventricular nodal tachycardia. The attacks became less frequent and of shorter duration. It is not clear, however, whether the physostigmine produced this effect, as strophanthus was used simultaneously. Wenckebach used physostigmine only in cases in which the condition was of long standing and in which quinine did not help. Occasionally the tachycardia was changed to bradycardia. He also used it in combination with digitalis and said that physostigmine enhances the effect of the digitalis. Minet, Legrand and Prelot expressed the belief that physostigmine therapy is successful only in rare cases of tachycardia in which there is a high degree of sympathetic tone. The effect is slow, inconstant and transitory. De Meyer used physostigmine and digitalis and concluded that the therapeutic value of physostigmine is questionable. We found no mention of the administration of physostigmine to children suffering from atrioventricular nodal paroxysmal tachycardia. Our case demonstrates that physostigmine salicylate when given intravenously slows the heart rate and may even stop the beat, but that because the sino-auricular node and the auricular muscle remain depressed the rhythm continues to emanate from the atrioventricular node. The effect is transitory.

Franke and Weiner administered pilocarpine to a child of 10 years who had an attack of tachycardia which could be interpreted either as auricular flutter or atrioventricular nodal tachycardia. There was a slowing of the cardiac rate, but only for a short period. The administration of pilocarpine nitrate in our case produced no effect on the cardiac rate or rhythm.

Wenckebach stated that quinine is effective in treating all types of tachycardia, whether auricular, ventricular or nodal. The effect is produced at once or not at all. Willius and Amberg used quinine sulfate in doses of 65 mg. every four hours day and night in their case of paroxysmal nodal tachycardia. They succeeded in producing a slow nodal rhythm, which continued for months. Carr in 1932 administered qui-

nine sulfate in a case of paroxysmal nodal tachycardia without any effect. Shookhoff, Matussoff and Litvak gave 4 grains (0.256 Gm.) of quinine bisulfate to a child 3 years of age who was suffering from auricular flutter. The therapy produced no effect. They administered quinine bisulfate and quinine and urea hydrochloride to a child of 10 years with paroxysmal auricular tachycardia and were impressed by the fact that the drug seemed to aggravate the condition.

In view of Wenckebach's teaching and also in view of the fact that pharmacologically quinine decreases irritability, prolongs refraction and slows conduction, we used the drug in our case. No effect was observed.

The pharmacologic action of digitalis seems to make it the drug of choice with which to treat any condition of rapid heart rate, particularly when signs of myocardial weakness are present. Digitalis in sufficient doses slows conduction, increases the refractory period and decreases the irritability of the heart muscle. All these characteristics tend to decrease the heart rate. Added to these effects, digitalis also increases the muscle tone and strengthens the contractile power. These beneficial effects enhance its value. The literature, however, contains abundant warning against the use of digitalis in cases of tachycardia and particularly in cases of atrioventricular nodal rhythm.

In 1915 White observed in a case of auricular flutter that the administration of digitalis changed the rhythm to auricular fibrillation and then to atrioventricular nodal rhythm. Later he reported two cases in which atrioventricular nodal rhythm resulted from the use of digitalis. Cohn in 1917 described atrioventricular nodal rhythm as a result of the administration of digitalis. Eggleston mentioned atrioventricular nodal rhythm as one of the toxic effects of digitalis. Richardson observed the occurrence of atrioventricular nodal rhythm right after the administration of digitalis. On another occasion he observed atrioventricular nodal rhythm after the use of digitalis and a normal sinus rhythm after the effect of the digitalis had worn off. Eden expressed the opinion that digitalis may produce atrioventricular nodal tachycardia and may also stop it.

In 1918 Robinson and Wilson demonstrated experimentally that digitalis increases the rhythmicity of the ventricles and slows that of the auricles, so that when the rhythmicity of the ventricles exceeds that of the sinus node dissociation results. When impulses from several points in the ventricle arise, ventricular fibrillation follows. Levine observed that ventricular fibrillation may be one of the toxic effects of digitalis.

In the three cases of paroxysmal nodal tachycardia in children discussed in the literature, digitalis was used in two without any effect. Sutherland questioned the efficacy of digitalis in his case, and Koplik concluded that "children are as well off without as with digitalis" and that it should be used only when cardiac failure is imminent.

Shookhoff and his associates administered digitalis to a child 3 years of age suffering from auricular flutter, with a ventricular rate of 240 per minute. Twenty-four hours later the child became suddenly extremely cyanotic and died in a few seconds. They expressed the belief that the sudden death was due to ventricular fibrillation.

It is apparent, therefore, that although theoretically digitalis seems to be the drug of choice in the treatment of tachycardia, the experience reported in the literature not only discourages its use but presents a definite warning against it. Ventricular fibrillation seems to be a definite sequence experimentally and occasionally clinically. In view of such warnings, we postponed the use of this drug until the condition of the child became extreme and there were signs of severe and rapidly advancing decompensation. Our case demonstrates quite definitely, we believe, that digitalis will stop a paroxysm of atrioventricular nodal tachycardia and return the cardiac mechanism to a normal sinus rhythm. It also demonstrates the fact that the danger of ventricular fibrillation is real and must be kept in mind when such therapy is administered.

COMMENT

The case presented in this paper is apparently the first instance of paroxysmal nodal tachycardia in a new-born infant reported in the literature. We do not choose to venture into a discussion of the etiology of this disorder in our case. Version and extraction as a means of delivery have been a common procedure for many years, but no such consequence has been reported. Since the etiology is unknown, we followed a course of treatment based on pharmacologic principles. We deemed it wise to proceed with caution, using the least harmful methods first. We believe that the clinical course in our case brings into relief several observations. 1. Paroxysmal tachycardia without any known predisposing factors will if continued for several days cause cardiac decompensation. 2. The symptoms at the beginning of the disorder may be few and may therefore remain unnoticed. 3. Vagal stimulation, whether by reflex action or by chemical action, seems to produce no effect. 4. Physostigmine salicylate and pilocarpine nitrate may produce marked disturbance in the cardiac rhythm or peripheral vasomotor collapse. 5. The administration of digitalis, though fraught with the danger of producing ventricular fibrillation, seems to be the therapy of choice.

SUMMARY AND CONCLUSIONS

An unusual case of paroxysmal atrioventricular nodal tachycardia in a new-born infant is reported.

A complete review of the literature on paroxysmal tachycardia in children is presented. No case similar to our own was found.

Vagal stimulation or the administration of quinine seemed to have no effect on the abnormal cardiac rhythm in our case.

Digitalis seemed to be the drug of choice in relieving the paroxysm.

The late Dr. Charles E. Rynd gave us permission to study this case.

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Progress in Pediatrics

RECTAL DISORDERS IN CHILDHOOD

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Rectal disorders in infants and children are not uncommon, and at one time or another every physician or surgeon will be consulted concerning them. In the infant and in the child rectal disturbances will often be manifested by signs and symptoms elsewhere, such as restlessness, irritability, temper, loss of weight, loss of appetite or even convulsions. The child will not direct attention to the terminal part of the bowel, and the lesion may remain unrecognized unless some obvious sign, such as bleeding or protrusion, is observed.

There may be little in the past history or in the history of the present illness to direct the examiner's attention to a rectal disturbance. One can say at the outset that a deliberate examination of the anorectum and the sigmoid might in many cases reveal a lesion hitherto unsuspected. A careful and thorough digital examination supplemented by inspection under direct vision of the anus, rectum and sigmoid should become a more frequent practice in the investigation and treatment of the sick infant and child. Disorders of the anorectum and to a lesser degree of the sigmoid are not uncommon in children. Such lesions will be discovered only by a carefully planned search.

THE ANATOMY OF THE RECTUM AND THE SIGMOID IN CHILDREN

The anorectum and sigmoid of the infant differ in certain essentials from those of the adult. Not a great deal has been written on the anatomy of the infant's rectum, and there is much divergence in the various descriptions by different authors. This is due to the fact that the rectum and the sigmoid have been described at different age periods of development in childhood and to the fact that there is some degree of normal variation. The anatomy of the infant rectum will be dealt with so far as it concerns this study.

The pelvis in the new-born child is cone shaped. Its length is somewhat greater in proportion to the greatest transverse and the greatest anteroposterior diameter than in the adult. As a whole, the infant pelvis is much smaller relatively than that of the adult. The sacrum occupies a greater proportion of the pelvic circumference than in the adult. This bone in the infant has little of the concavity seen at later age periods

but on the contrary is almost flat on its intrapelvic surface. This lack of depression between the ilia is of considerable etiologic importance when one is dealing with prolapse of the rectum. The sacral promontory is less marked and lies at a higher level. The alae of the ilia are thick and rounded and extend upward in an abrupt fashion. The iliac fossae are shallow.

At birth the plane of the pelvis is almost vertical. This vertical position is gradually lost as the child grows older and commences to walk. The plane of the superior aperture forms an angle of about 80 degrees with the horizontal, as compared with approximately 60 degrees in the adult. The symphysis is also placed more vertically. During the first two years of life, the pelvis grows rapidly in all dimensions. From 2 years to the end of the first decade the rate of growth is much less rapid. The rate of growth increases again in the second decade, and by the end of this time the pelvis has almost attained its adult dimensions. However, many of the pelvic epiphyses do not unite with their main bones before the twenty-fifth year. Until the infant assumes the erect position, there is little change in the form and outline of the pelvis. As this position is habitually established, the sacrum becomes rounded and begins to descend between the ilia and the promontory is gradually established.

The absolute length of the rectum in the adult is approximately twice or slightly more than twice that of the rectum in the new-born child. This proportion is not invariably seen. The variation does not seem to be intimately associated with that of the weight or length of the body. Abt [1] stated that the rectum is relatively longer at birth and in early life than in the adult. However, from my observations, the ratio of the length of the trunk is practically the same in the infant as in the adult. The rectum, which is really the dilated distal portion of the colon, has an average length of between 5 and 6 inches (12 and 15 cm.) in the adult (rather shorter in women). The rectum at birth and during the early months of infancy has a length of between 2½ and 3 inches (6 and 7.5 cm.). At the end of the second year of life there is an increase of between one-fourth and one-third in length. From 2 years to the end of the first decade the rate of growth is much less rapid. It increases again in the second decade, and by the end of this time the rectum has attained its adult length and dimensions. Passow [2] stated that the surface area of the bowel increases approximately fourfold between infancy and maturity. This result was arrived at by

1. Abt, I. A.: Pediatrics, Philadelphia, W. B. Saunders Company, 1923, vol. 1, pp. 318-327.

2. Passow, A., cited by Abt.[1]

measuring the surface area of the interior of the intestine. This ratio is the approximate diameter of the ampulla of the infant rectum as compared to that of the adult. From protoscopic studies of the living new-born infant the lumen of the rectum is approximately one-quarter that of the adult rectum. There is a considerable increase in the diameter of the ampulla recti and the anal canal up to the second year of postnatal life. This closely approximates the figures for the growth in length. The roominess of the ampulla and the anal canal increases from one-fourth to one-third by the end of the second year. From 2 years to the end of the first decade the rate of increase in diameter is much slower. This rate increases again in the second decade, and at end of this time the lumen of the bowel has reached its adult proportions. At birth the rectum occupies the whole of the pelvic cavity (true pelvis) to the exclusion of the rest of the intestinal tract and may be so distended with meconium that it not only fills the pelvis but rises into the false pelvis and the abdomen proper. It is not until later in infancy that any part of the small intestine descends into the pelvic cavity.[3] The rectum at birth and in early childhood is almost vertical and is much straighter than in later life. The lateral and anteroposterior curves seen in the adult rectum are absent. This is in a great measure due to the flatness of the sacrum, i. e., its lack of depression between the ilia, and to the vertical plane of the pelvis, as already mentioned. The upper pole is directed to either side of the pelvis, usually the right.

The lateral ligaments of the rectum are poorly developed in children and are low as compared to those of the adult. Houston's valves are present at birth but may be flattened when the bowel is distended. In the infant the anterior reflection of the peritoneum is low, and according to Ballantyne [4] this is usually at the level of the fourth sacral vertebra. This makes for a rather deep rectovesical and rectovaginal pouch and should be borne in mind in any operative procedure on the rectum. Relatively speaking, the relations in the infant of the trigon of the bladder, the prostate gland, the seminal vesicles and the bulb of the urethra in the male and of the broad ligaments, the neck of the uterus, the cervix uteri and the posterior vaginal wall in the female are much the same as in the adult.

The anal canal lies completely below the level of the tip of the coccyx at birth, and the anal orifice occupies a more posterior position than that of the adult. A vertical line drawn downward from the tip

3. Symington, J.: The Topographical Anatomy of the Child, Edinburgh, E. & S. Livingston, 1887.

4. Ballantyne, J. W.: An Introduction to the Diseases of Infancy, London, Oliver & Boyd, 1891.

of the coccyx will be found to pass through the anal orifice, whereas in the adult such a line generally will be distinctly behind it. A consideration of certain anatomic landmarks of the anal canal and the anorectum in the infant and in the child is essential, because several important lesions occur in this area. The anal canal is a narrow slitlike passage lined by squamous epithelium possessing a moderate degree of elasticity and distensibility. This permits the passage of a bulky formed stool or of the lubricated index finger. Infants and children pass stools of a bulky diameter, and one can therefore comfortably pass the index finger in infants over 2 years of age and the small finger in infants under this period. The anal canal at birth measured from the external orifice to the anorectal line is approximately 1 inch (2.5 cm.) in length posteriorly. In its anterior half the length is approximately ½ inch (1.2 cm.). There is an increase of about one-fourth to one-third by the end of the second year of postnatal life. From 2 years to the end of the first decade the rate of growth of the anal canal is slower. The rate of growth increases again in the second decade, and the anal canal reaches the full degree of its development by the twentieth year. By the length of the anal canal is meant the length from the external orifice to the anorectal line, which is the top of the anal musculature at its junction with the rectum. As in the adult, the anorectal line lies closer to the skin surface in its anterior than in its posterior circumference. The anal canal is surrounded by its muscles, the sphincters and the levatores ani. These form its immediate boundaries. The anal canal is lined by squamous epithelium continuous with the skin of the integument. The transition to columnar epithelium occurs just above the dentate, or pectinate, line, i. e., above the level of the crypts of Morgagni. The dentate, or pectinate, line marks the embryologic junction of the proctodeal membrane, where this membrane broke down (or was absorbed) and fusion occurred between the proctodeum and the hindgut. The pectinate line is crowned with the anal papillae, and under these are the pockets, or crypts, of Morgagni. Extending up from the crypts of Morgagni are longitudinal folds of mucous membrane, known as the columns of Morgagni. These columns are only of academic interest, whereas the pockets of Morgagni and the anal papillae are of great importance in the lesions to be presently described. The distance from the skin of the integument to the dentate line is very short indeed, much shorter than the total length of the anal canal already described. The dentate line in the infant may be no more than ¼ to ½ inch (0.6 to 1.2 cm.) from the anal opening, i. e., it lies very close to the surface. The white line of Hilton, frequently referred to, is of no great importance as an anatomic entity in this study. This is a pale circular area lying below the dentate line and is actually the anal intermuscular

septum of fascia from the longitudinal muscle of the bowel, which is inserted beneath the skin of the anal canal and gives a whitish appearance by reflected light. The presence of the dentate line and the pockets of Morgagni present a variable appearance in different infants and children. In some infants the anal papillae are well marked and the crypts are deep and well formed. In other infants there is a more or less sudden transition from squamous to columnar epithelium and the dentate area is hardly recognizable. Herrmann and Desfosses,[5] Harris,[6] Lockhart-Mummary [7] and Tucker and Hellwig [8] have all described racemose multiglandular structures running out from the bottom of the crypts of Morgagni through the anal musculature into the perianal tissues. The ducts of these glands have been demonstrated in many instances to open at the bottom of the anal crypts. The presence of these glands is also variable, and these, according to the authors, are probably evolutionary cloacal rudiments. They are, however, of great clinical importance and will be dealt with under a consideration of pathologic conditions of the anus.

The sigmoid in the infant and in the child has a most interesting arrangement. The absolute length of the intestinal tract in the adult is approximately twice that in the new-born child. The diameter of the lumen of the large bowel and the sigmoid of the new-born is approximately one quarter that in the adult. If the length of the intestine is compared with that of the trunk, there is little if any relative difference between the intestine-trunk ratios in the infant and in the adult. The ratio between the lengths of the large and the small intestine remains almost unchanged throughout postnatal life. The sigmoid by its arrangement is the most remarkable part of the large intestine. At birth it is enormously distended with meconium, and as the true pelvis is more or less filled by the rectum, it is too small to contain any part of the sigmoid. This part of the large intestine therefore projects freely and often far up into the abdominal cavity. The sigmoid colon in the infant and young child may take on various patterns in its anatomic arrangement. Boucart [9] recognized and described three main types: (*a*) the ascending, (*b*) the transverse and (*c*) the descending. The ascending is

5. Herrmann, G., and Desfosses, L.: Sur la muqueuse de la région cloacale du rectum, Compt. rend. Acad. d. sc. **90**:1301, 1880.

6. Harris, H. A.: Discussion of Fistula-in-Ano: Some Embryological Aspects of the Problem Involved, Proc. Roy. Soc. Med. (Sect. Surg., Sub.-Sect. Proct.) **22**:43, 1929.

7. Lockhart-Mummery, J. P.: Discussion on Fistula-in-Ano, Proc. Roy. Soc. Med. (Sect. Surg., Sub.-Sect. Proct.) **22**:33, 1929.

8. Tucker, C. C., and Hellwig, C. A.: Histopathology of the Anal Crypts, Tr. Am. Proct. Soc., 1933, p. 47.

9. Bourcart, A.: De la situation de l'Siliaque chez le nouveau-né dans ses rapports avec l'établissement d'un anus artificiel, Thèse de Paris, no. 130, 1863.

by far the commonest type encountered and represents between 75 and 80 per cent of all those classified in the three groups. This ascending type of sigmoid as a rule possesses three loops. The first rises from the rectosigmoid junction into the false pelvis and has its apex directed downward into the left iliac fossa. This passes over into the main loop, which is directed upward into the abdominal cavity and which may in certain cases reach beyond the level of the umbilicus. The sigmoid after forming this second loop descends and forms a third small loop which dips down toward the pelvic brim. It can thus be seen how redundant and complex a pattern a high percentage of the sigmoid flexures examined will take. In the next type (*b*) there is a sharp rectosigmoid angle and the sigmoid passes transversely across the lower part of the abdomen as a loop, with the apex lodged in the right iliac fossa above the pelvic brim. This type represents about 20 to 25 per cent of those examined. The next type (*c*) is the rarest form the sigmoid may take and is described by Bourcart, whose description is quoted by Abt. In this type the sigmoid passes directly over the left iliac fossa and into the lesser pelvis. Since the rectum in a young infant generally fills and crowds the true pelvis, it is easy to understand how rare this variety must be. The sigmoid nearly always lies in front of the small intestine and therefore comes in contact with the anterior abdominal wall. It must be recognized that in a high percentage of all infants part of the sigmoid will be found toward the right in the right iliac fossa.

This unusual arrangement of the sigmoid in infants and young children must of necessity render instrumental examination of this part of the large bowel a delicate undertaking. This will be discussed under sigmoidoscopic investigation.

METHODS OF EXAMINATION

As a rule, it is necessary to administer a general anesthetic in order to perform an adequate examination of the anorectum and the sigmoid of a young child. It is almost impossible for the conscious young child or infant to cooperate sufficiently during such an examination. Not only will it be impossible to visualize the terminal part of the bowel, but serious trauma might result from a struggle. For the adult, on the other hand, it should never be necessary to give an anesthetic prior to a proctosigmoidoscopic examination. The lower portion of the bowel should be cleansed with a small enema of tap water or a sufficient dose of syrup of figs or magnesia magma should be administered the night prior to the examination. The child should have nothing by mouth for at least three hours before the examination. After general anesthesia has been induced, either the right or the left Syme position should be assumed, with a small pillow under the hip joint throwing the body forward in an extended manner on the face.

The instruments which I employ are as follows and are illustrated in the accompanying photographs: A small tubular proctoscope [10] (my design), 7 cm. in length, 2 cm. in diameter in its upper extremity and 1.5 cm. in diameter in its lower extremity, is employed in visualizing the anal canal and the rectum. The room is darkened, and a headlight is employed during visualization. With my proctoscope, which is approximately 3 inches (7.5 cm.) in length, it is generally possible to visualize practically the whole length of the infant rectum. The approximate length of the rectum at birth and up to the second year of life is between 2½ and 3 inches (6 and 7.5 cm.). As already pointed out, by the end of the second year there is an increase of between one-fourth and one-third in length. The length and diameter of the terminal part of the bowel undergo little change in rate of growth from 2 years until the end of the first decade. It is therefore possible with my small tubular

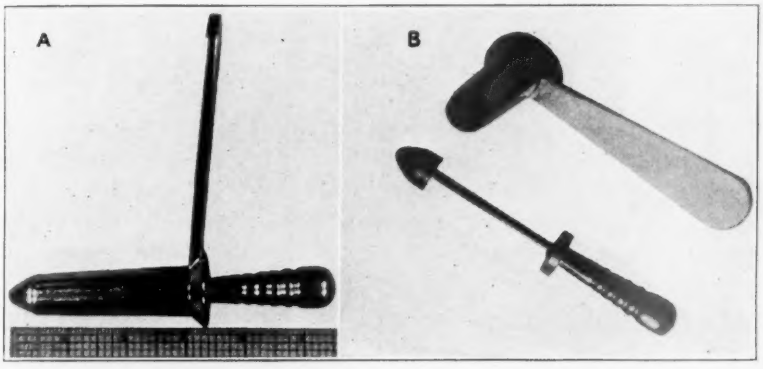

Fig. 1.—*A*, the proctoscope described in the text. This instrument is approximately 3 inches (7.5 cm.) in length. *B*, the proctoscope shown in *A*, with the obturator removed.

proctoscope under proper conditions of posture, as already outlined, to visualize almost adequately the full length of the rectum up to the age of 10 years.

Before one proceeds with instrumental examination, the external perianal tissues and the integument should be carefully inspected. Inspection is essential; any redness, bulging or alteration in contour should be noted. Digital examination follows. In very young children it is preferable to use the small finger well lubricated; in older children one experiences no difficulty in passing the index finger.[11] The full

10. The instrument may be obtained from the Brass & Bronze Manufacturing Co., 269 Craig St. West, Montreal, Canada.

11. Daniels, E. A.: Fundamentals in Rectal Diagnosis, Canad. M. A. J. **31:** 289, 1934.

length of the rectum as high as the rectosigmoid angle can be palpated without difficulty. The pelvic organs can easily be outlined. One should note the presence of free blood or pus on the examining finger by wiping it on a piece of gauze.

Sigmoidoscopy may be successfully carried out with the patient under general anesthesia and in the right or the left Syme position, as described. I employ my modified type of the Strauss sigmoidoscope.[12] This instrument has a length of 20 cm. and a diameter of 1.2 cm. It has a terminal light, and works from a dry cell battery, with a rheostat.

The diameter of the lumen of the sigmoid in the infant is approximately one-fourth that of the adult, and the rate of increase in the

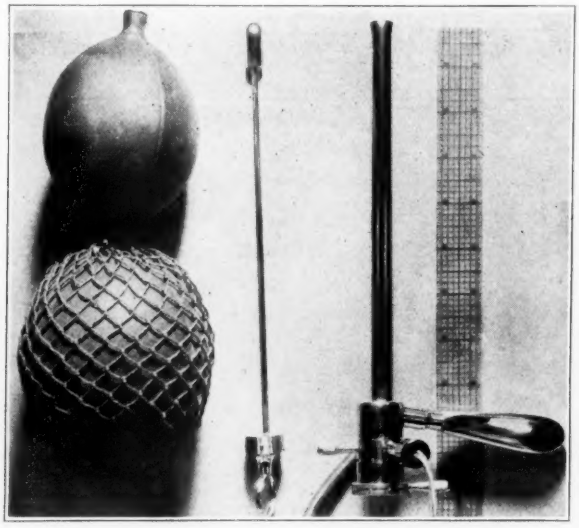

Fig. 2.—Modification of the Strauss infant sigmoidoscope. This instrument possesses a working length of 20 cm. and a diameter of 1.2 cm.

diameter and in the length closely approximates that of the rectum. The sigmoid in the infant and in the child is often long and tortuous, and, as already stated, it may have an unusual axis to the right or the left of the pelvis and may rise high into the abdominal cavity. No difficulty should be encountered in traversing the rectum, which is almost vertical in the infant and in the child, so that the upper pole may be found either to the right or to the left of the pelvis. The various patterns that the sigmoid colon may assume, as described by Bourcart, must be remembered in performing the sigmoidoscopic examination. Patience and good relaxation and anesthesia therefore become essential

12. This instrument may be obtained from Allen & Hanbury's, Bethnal Green, London, E.2, England.

features in the examination. Gentle inflation of the bowel should be practiced. The instrument should never be forced ahead unless one can actually see the lumen beyond the end of the instrument. During proctoscopy one notes the condition of the pectinate area, the hemorrhoidal area and the mucous membrane and looks carefully for any discharge of blood or pus coming through the rectosigmoid angle. Any encroachment on the rectum from without is carefully observed during proctoscopic examination. During sigmoidoscopy one carefully notes the condition of the mucous membrane, the patency of the lumen of the bowel and its mobility. It may be advisable in certain cases to take a smear culture directly from the mucous membrane during proctosigmoidoscopic examination. To complete the examination, inspection of the vulva in a girl and of the penis and meatus in a boy, together with abdominal palpation, should be carried out. The pediatrician's opinion on the general health of the child may in the final analysis of the case prove a valuable source of helpful information.

CONGENITAL MALFORMATION

Congenital malformation of the rectum and the anus is rare. It is found only in a small percentage of all births. Starr (quoted by Lockhart-Mummery [13]) observed that approximately only 1 child in 10,000 is born with an imperforate anus. However, lesser degrees of congenital anomaly are not uncommon, and unless they produce mechanical impediment to alimentation or become incompatible with life, they may not come to the attention of the attending physician. Although such congenital defects are rare, it is necessary to understand their fundamentals in order that the imminent danger to the child's life may be dealt with and appropriate treatment applied in such a surgical emergency. The embryologic development of the hindgut is rather complicated, and the reader might well refer to a standard text on the subject. I shall, however, deal with the salient points in the evolution of the development of the terminal bowel so far only as it concerns the surgical lesions to be described.

In the early development of the human embryo, the allantois is continuous with the hindgut and enters into the formation of the stalk of the body. A U-shaped angulation is formed at the point where the allantois joins with the hindgut. The apex of this angulation becomes increasingly dilated in embryonic life and forms a pouch situated at the posterior end of the embryo (postallantoic gut) into which open the allantois in front and the hindgut above. As the hindportion of the body continues to grow backward, this pouch of the hindgut continues

13. Lockhart-Mummery, J. P.: Diseases of the Rectum and Colon and Their Surgical Treatment, ed. 2, Baltimore, William Wood & Company, 1934.

to grow in the same direction past its anterior, or cloacal, opening. This opening, continuous with the allantois, becomes sealed off in the process of development. The hindgut and its posterior sacculation (postallantoic gut) below the sealed-off allantois at this stage are without any communication with the outside of the body. The next step in the evolution of the anorectum is the appearance of a slight depression on the skin surface of the perineum at a point on a line parallel with the long axis of the rectum. This is known as the proctodeum, which is simply an ectodermal depression in the area which will go to form the anus. This forms a membrane known as the proctodeal membrane, which soon breaks down or is absorbed, thus forming a communication with the postallantoic gut and opening into it. It will thus be seen that the rectum and the anus are developed from three distinct embryonic structures: (1) the hindgut, (2) the pouch developed by the downward prolongation of the hindgut behind the allantois (which lies in front), known as the postallantois gut, and (3) the proctodeum. The line of junction of the hindgut and the postallantois gut is indicated in the adult rectum roughly by the reflection of the peritoneum from the anterior surface of the rectum (Lockhart-Mummery [12]). The line of junction of the proctodeum and the postallantoic gut has as its landmark the dentate line (the pockets, or crypts, of Morgagni). This is easily understandable because at the dentate line the squamous epithelium, which is really an invagination from the body wall, fuses into the columnar epithelium of the lower part of the rectum. This line of transition between squamous and columnar epithelium together with the pockets of Morgagni marks the junction at which the embryonal proctodeal membrane breaks down.

If one understands the fundamental steps in the evolution of the anorectum, one can almost visualize the various defects which might result from arrested or faulty development: (A) deformities as a result of imperfect obliteration of the proctodeal membrane and (B) deformities resulting from arrested development of the rectum—(1) inadequate sacculation or development of the postallantoic gut and (2) failure of the closure of the communication between the allantois and the hindgut.

Treatment consists in a careful conservative approach to the problem. The rarity of the lesions does not afford the average surgeon a wide experience in dealing with them. It is imperative that there be an outlet for the feces. Imperforate anus due to a failure of obliteration of the proctodeal membrane is the simplest lesion to deal with. When there is no outlet for meconium or feces, delay is fatal. The child should be put into as good a general condition as possible, and an immediate examination and search should be made to determine the type of developmental defect that one is dealing with. The perineum should be opened by a midline incision from the scrotum or the fourchette to the

coccyx and the rectal pouch sought for, the dissection being kept as much as possible in the hollow of the sacrum, as otherwise there is considerable danger of wounding the genito-urinary organs. Blind probing is a dangerous method of treatment. By pressing on the abdomen or making the child cry, the bulging postallantoic pouch filled with meconium may nearly always be palpated. Whenever possible this should be not only opened but brought down and sutured at the skin surface at the site where the anus should be present. Long tedious surgical procedures should never be indulged in, as this endangers the child's life. Colostomy may be the only expedient when the postallantoic gut is absent and when the terminal portion of the bowel is just a stringy mass of tissue. Rectovesical fistula calls for immediate colostomy unless it can be simply closed at once, because of the imminent danger of infection of the urinary tract. The reader will have to refer to special articles on the subject for more complete details.

DIARRHEA IN INFANCY AND CHILDHOOD

Diarrhea lies within the field of the pediatrician and only indirectly concerns this thesis. Prolonged diarrhea may produce ulceration of the rectal mucosa together with congestion or infection of the crypts of Morgagni owing to the continual passage of liquid stools. Such a condition may also lead to much irritation of the skin, with infection of the perianal tissues and the formation of perianal or ischiorectal abscesses. Treatment of the diarrhea by the pediatrician may not elicit a satisfactory response, because such proctitis and cryptitis will encourage the continuance of tenesmus and diarrhea. I have found that instillation or swabbing of the mucosa of the rectum and the anal crypts through a small proctoscope with a 5 per cent solution of mild protein silver will often cut short a troublesome diarrhea which has resisted other forms of treatment. The crypts of Morgagni may be emptied by retrograde pressure by the passage of the gloved small or index finger lubricated with a soothing ointment (compound tincture of benzoin and olive oil, each 2 drachms [7.3 cc.], with zinc oxide ointment to make 1 ounce [29.5 cc.]). The instillation of from 2 to 3 ounces (59 to 88 cc.) of a warm solution of 5 per cent bismuth subgallate in olive oil or sweet almond oil once daily for several days has been found helpful in relieving certain of these troublesome diarrheas.

The usefulness of these measures will be apparent if one passes a small proctoscope in cases of long-continued diarrhea. Even when ulceration of the mucosa and purulent cryptitis are not present, one will observe congestion and engorgement of the mucous membrane and the anal canal associated with spasmodic contraction of the anal sphincters.

PERIANAL AND PARARECTAL SUPPURATION

Infants are susceptible to infection of the perianal tissues. Such infections are assumed to be a result of lack of cleanliness. In my experience, however, they are more often caused by frequent passage of liquid stools. This results in congestion of the squamous epithelium of the anal canal, with redness and either a mucoid or a mucopurulent discharge from the pockets of Morgagni. It is probable that infection of the perianal tissues next occurs from the crypts of Morgagni, by secondary infection of the perianal multilobular glands, which extend out into the ischiorectal areas from the anal canal. These perianal glands, already mentioned, have been described by Tucker and Hellwig,[8] Herrmann and Desfosses,[5] Harris[6] and Lockhart-Mummery.[7] Restlessness and fever are soon followed by a large perianal indurated area. Such a condition should be treated by the usual surgical measures. One should wait for a central area of softening to appear and should carry on with hot moist applications until this occurs. The child will require supportive measures, together with small doses of camphorated tincture of opium to allay pain and restlessness. A simple incision in a radial manner outward from the anal orifice with the child under light anesthesia is all that should be attempted when softening has occurred. The edges of the skin should be trimmed away to afford better drainage. One hopes that a fistulous communication with the bowel has not occurred. Blind probing should not be indulged in, and if a fistula does present itself it must be dealt with at a later stage. One is dealing with an acute infection, and nothing beyond simple drainage should be attempted.

If a fistulous communication is later discovered, the internal opening will generally be found superficially under one of the anal crypts beneath the subcutaneous portion of the external sphincter muscle, which can be divided with impunity. At the second stage of the operation one must not make the mistake of looking for the internal opening in one of the normal perianal or pararectal fascial planes through which a probe can easily be passed. The depth of the ischiorectal fossa might present such a pitfall. The internal opening, as already pointed out, will nearly always be found superficially in the area of the dentate line (crypts of Morgagni).

Pararectal suppuration at a higher level either above or below the levator ani muscles is a more serious but fortunately a much rarer condition. Drainage becomes imperative, and the attendant's judgment is often taxed concerning the time for intervention. This, however, should not be delayed too long, as the infection may spread in any direction and the child's life be endangered. The incision is made

through the perianal skin surface, and the fibers of the levator muscle may have to be entered and traversed to reach a supralevator collection of pus. There is not much danger of wounding important structures if one keeps either in the posterior or in the lateral plane. Anteriorly there is a grave possibility of damaging the peritoneum, the reflection of which in infants is low.

FISSURA IN ANO

Anal fissure is among the commonest of the infections of the terminal part of the bowel in children. It is, however, often confused with a condition of simple spasm which is associated with congestion and infection of the crypts of Morgagni[14] (cryptitis). Anal fissure is generally preceded by this state of spasm and anal congestion; because of the resultant pain and difficulty in evacuation, the disturbance is often labeled fissura in ano. There can be no doubt that cryptitis (congestion or inflammation of the crypts of Morgagni) is the initial stage, which may or may not lead to the development of anal fissure. The spasm resulting from this anal engorgement renders the canal vulnerable. The passage of bulky stools becomes impossible, and constipation ensues.[15] Unless liquefaction of the bowel contents is effected, it is easy to see that the passage of a bulky stool accompanied by straining through a tight anal orifice will result in a tear and the lesion known as fissura in ano will become established.

Treatment should be conservative. Liquefaction of the stool will not effect a cure of either the cryptitis or a fissure. In the early stages of such a lesion the passage of the small finger lubricated with the benzoin cream already described or petrolatum should be practiced daily. The bowel movement should be assisted with small doses of syrup of figs or magnesia magma—just enough to soften the bowel content. The intake of raw vegetables, fruit and other cellulose-containing foods should be somewhat reduced. Daily warm hip baths or hot boric acid compresses to the perianal region are helpful when supplemented by the aforementioned measures. Chronic fissure or marked spasm or stenosis that does not respond to such a regimen and in which relief or cure is not effected will require the injection of one of the oil-soluble anesthetics into the dorsal anorectal musculature under light inhalation anesthesia, supplemented by dilation, or stretching of this musculature under deeper general anesthesia may need to be

14. Daniels, E. A.: Anal Fissure, Anal Spasm and Anal Stenosis, Am. J. Digest. Dis. & Nutrition **3**:775, 1936.

15. Daniels, E. A.: The Ano-Rectum in Chronic Constipation, Canad. M. A. J. **34**:169, 1936.

practiced.[16] In many cases the development of fissura in ano could be avoided by recognizing the early stages of constipation resulting from anal congestion and cryptitis.

HEMORRHOIDS

The existence of internal hemorrhoids (dilatation of the tributaries of the superior hemorrhoidal plexus of veins covered by columnar epithelium) in infants and children must be seriously questioned. I have never seen true internal hemorrhoids in an infant or a child. Internal hemorrhoids are, however, common in young adults beyond the adolescent period and are usually of the low vascular variety. On the other hand, external hemorrhoids—dilated veins under the perianal skin or under the squamous epithelium of the anal canal (external hemorrhoidal veins not emptying into the portal circulation and not covered by columnar epithelium) are not uncommon in infants and children. These do not bleed and do not protrude from the lumen of the bowel but are observed as a dilated perianal corona of bluish veins covered by skin or squamous epithelium. They become evident during strain at stool or crying and may at times become thrombosed. Ashton,[17] Ogston and Vincent [18] reported cases of external hemorrhoids in children. Archibald [19] recorded a case in a girl 8 years of age, which from his original paper appears to be an instance of true internal hemorrhoids.

The treatment of external hemorrhoids in children is that of simple attention to the child's bowels and nothing further. Should thrombosis of one of these external hemorrhoidal veins occur (really a rupture of the wall of the vein with the clot lying under the skin or squamous epithelium), then it might be incised and turned out. In Archibald's case, in which there was bleeding, the condition responded to simple measures.

PROLAPSE OF THE RECTUM

Prolapse of the rectum is one of the commonest of the lesions of the rectum occurring in infants and young children. The prolapse is usually of the variety involving the mucous membrane. Complete

16. Gabriel, W. B.: (*a*) Treatment of Pruritis Ani and Anal Fissure: Use of Anaesthetic Solutions in Oil, Brit. M. J. **1**:1070 (June 15) 1929. (*b*) Recent Advances in the Treatment of Rectal Diseases, Practitioner **133**:489, 1934. (*c*) Daniels.[14]

17. Ashton, T. J.: On the Diseases, Injuries and Malformations of the Rectum and Anus, ed. 2, Philadelphia, Henry C. Lea, 1857, pp. 75-88.

18. Ogston, F., Jr., and Vincent, G.: External Haemorrhoids in a New-Born Child, Lancet **1**:819 (May 12) 1883.

19. Archibald, E. W.: Haemorrhoids in Children, with Report of a Case, Montreal M. J. **28**:111, 1899.

prolapse including the muscular layers of the bowel is an uncommon form, and when observed it is found in older children of the undernourished type. In this variety there is a descent not only of the redundant mucous membrane but of the muscular coats of the bowel. Prolapse of the mucous membrane of the rectum may be observed in an infant or a child of any age. Examination of the child in the act of straining or after a bowel movement will reveal protrusion of a complete cuff of redundant mucous membrane. This has concentric folds, and palpation will reveal that it contains none of the muscularis. The redundant cuff can easily be reduced. That prolapse of the rectum should frequently occur in infants and in young children is understandable when one reviews the anatomic structure of the infant pelvis. The vertical plane of the infant pelvis, the flatness of the sacrum and the vertical position of the rectum are all factors which render the terminal part of the bowel vulnerable. The mucosa is normally loosely attached to the submucosa, especially in the anterior quadrant, where it presents itself in large redundant folds. This can easily be demonstrated by injecting any fluid submucosally, and it will be seen how readily the mucosa will "float" off its submucosal bed. The aforementioned predisposing factors together with straining and gravity are no doubt the causes operative in freeing a redundant mucosa of the lower part of the rectum and in presenting this as a cufflike protrusion from the anal orifice.

Treatment must be conservative. In such cases the condition will more often than not cure itself. As the infant grows older, the pelvis gradually loses its vertical plane and inclines more toward the horizontal. The sacrum becomes hollowed out. The muscular layers of the bowel develop, and the redundant mucosal slack is taken up. These considerations tend to effect a spontaneous cure as the child grows older. Straining should be avoided, and mild laxatives are indicated. The redundancy should be reduced when extruded, and a firm support should be worn over the anal orifice. Gain of weight is advantageous. In older children, if the mucosal prolapse is a large one and if spontaneous cure is not considered likely, one should proceed to inject a 5 per cent solution of phenol in expressed oil of almond into the mucosal redundancy.[20] This is done at several sittings, with the child in either a left or a right Syme position and preferably under light inhalation anesthesia. One begins at the top of the redundancy in carrying out the technic of injection. One must remember the low reflection of the peritoneum anteriorly, as in children Douglas' pouch lies at a lower level than in adults. There is no danger if one keeps

20. Daniels, E. A.: The Hemorrhoidal Lesion, Am. J. Digest. Dis. & Nutrition **2**:631, 1935.

in the submucous plane and the mucosa is seen to "float" during the injection in the anterior mucosal quadrant. Although phenol is fairly toxic, I have frequently injected from 3 to 10 cc. of this 5 per cent solution at two week intervals without any obvious ill effects.[20] I have found my small tubular proctoscope, already described, easily adaptable for this injection treatment. No special routine is required. Bowel movements are permitted within twenty-four hours. In cases of severe involvement the ampulla is lightly packed with petrolatum gauze, one end protruding from the anus. This is left in for twenty-four hours and helps the establishment of the submucous indurative process (principle of the treatment) which fixes the redundant mucous membrane. The rarer form of complete rectal prolapse in which fixing the redundant mucosa does not effect a cure is treated by the Gabriel [21] method of pararectal injections of a solution of quinine sulfate and dilute

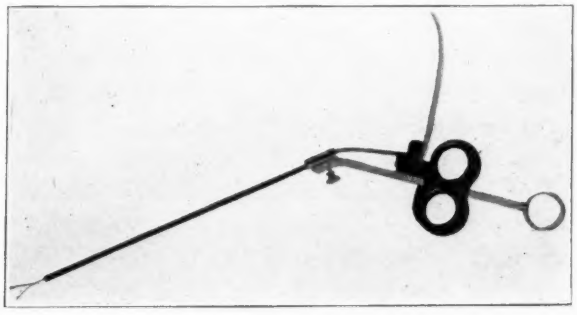

Fig. 3.—The Frankfeldt snare described in the text.

sulfuric acid in distilled water in doses of 1 to 2 cc. into the pararectal fossae (lateral and posterior).

BENIGN EPITHELIAL TUMORS

A benign tumor of epithelial origin, an adenoma or a papilloma, will cause free rectal bleeding. The location is usually in the lower part of the rectum, but the growth may more rarely occur in the sigmoid. As a rule, the tumor is single and may or may not be pedunculated. It may easily be observed during proctosigmoidoscopic examination as a cherry-like protuberance from the normal, paler pink mucosa. Careful fulguration should be practiced. I employ a Frankfeldt snare, as shown, with preliminary crushing or ligature of the pedicle, if possible. The lesion is easily dealt with when present in the lower part of the rectum but becomes a difficult problem when located in the upper part

21. Gabriel, W. B.: The Principles and Practice of Rectal Surgery, ed. 1, London, H. K. Lewis & Co., Ltd., 1932.

of the rectum or in the sigmoid. I prefer repeated crushing of the tumor rather than fulguration or crushing combined with light fulguration when the adenoma is present in the upper part of the rectum or in the sigmoid. There is danger of free hemorrhage or perforation of the bowel if one attempts to ablate such a high-lying lesion in one sitting. For adenoma of the sigmoid, abdominal section is not recommended except in unusual cases, as there may be great difficulty in locating the tumor, and resection of the segment of the bowel renders the whole procedure formidable and the mortality rate considerable.

I shall not deal here with the unfortunate familial disease multiple polyposis intestini found in young adults. The subject is adequately dealt with in standard textbooks.

PROCTITIS

The mucosa of the rectum may acquire an inflammatory process from any insult, due to food, a chemical or a bacterium. Appropriate treatment is thus indicated when the cause is recognized. This is supplemented by instillations of a 5 per cent solution of bismuth subgallate in olive oil and topical applications through a proctoscope of aqueous solution of metaphen (1 : 1,500) or the various forms of weak silver solution. One may observe infection with the various types of bacteria, such as the pneumococcus, the gonococcus of Neisser and Bacillus diphtheriae. Bacteriologic and parasitologic studies are indicated in all cases of proctitis.

SUMMARY

The lesions occurring in the infant's rectum differ in many essentials from those in the rectum of the adult. Careful deliberate study and judgment are necessary in dealing with disturbances of the terminal part of the bowel in children.

Abstracts from Current Literature

Anatomy and Physiology

CALCIUM AND PROTEIN CHANGES IN SERUM DURING SLEEP AND REST WITHOUT SLEEP. N. R. COOPERMAN, Am. J. Physiol. **116**:531 (Aug.) 1936.

The total calcium and serum protein contents of the blood show a decrease during sleep and rest without sleep, but the ionized calcium content remains the same or shows an increase. The changes seem to be correlated with an increase in the volume of the circulating plasma.

NOURSE, Cleveland.

DEPRESSION OF RESPIRATION BY OXYGEN. E. K. MARSHALL JR. and M. ROSENFELD, J. Pharmacol. & Exper. Therap. **57**:437 (Aug.) 1936.

While investigating respiratory stimulants in animals, Marshall and Rosenfeld noted that oxygen further depressed respiration, even to the point of apnea and death. The present paper is a careful study of this phenomenon in animals. They summarize the study in part as follows: "Under certain conditions of respiratory depression, the administration of oxygen may further depress respiration or even lead to apnea and respiratory failure. It appears that in animals deeply depressed with certain anesthetics respiration may be maintained almost entirely by an anoxemic stimulus, so that oxygen by removing this stimulus depresses or abolishes respiration." Animals anesthetized by certain barbital compounds, given alone or with morphine, were easily depressed by oxygen; while those anesthetized by chlorbutanol, urethane, paraldehyde and alcohol were not seriously depressed by oxygen. The explanation for this phenomenon is given in the text.

PILCHER, Cleveland.

THE OSSIFICATION OF THE CARPAL CENTRES IN COLOURED CHILDREN. F. H. DOMMISSE and C. L. LEIPOLDT, South African M. J. **10**:713 (Oct. 24) 1936.

In a study of 200 normal infants and children under 8 years of age living in Cape Town, South Africa, the authors found the rate of ossification of the carpal centers in colored children to be several months in advance of the rate in European children. A striking acceleration of the rate for the lower ulnar and radial epiphyses was shown in colored children. There was no evidence that this acceleration was dependent on differences in the nutrition of the children.

GONCE, Madison, Wis.

Biochemistry; Bacteriology, and Pathology

A COMPARISON OF THE EFFECT OF BETA-LACTOSE AND OF FAT UPON THE FLORA OF THE INFANT'S STOOL. JESSE R. GERSTLEY, KATHERINE M. HOWELL, HELEN ZABOROWSKI and GLORY MORIN, Arch. Pediat. **53**:784 (Dec.) 1936.

In the present study six infants were observed by the authors. The feedings consisted of klim, diluted to one-half strength with milk, plus varying amounts of cream and beta-lactose. Bacterial smears and determinations of the concentration hydrogen ion were made on specimens of the stools.

The gram-positive and gram-negative organisms in the smears were counted, and the ratio of each in the stool was estimated.

The increase of fat in the diet produced no increase in the acidity or in the gram-positive flora of the stool. When the feedings contained sufficient amounts of beta-lactose, there was an increase in the acidity and in the number of gram-positive flora of the stool, regardless of the fat content of the diet.

ORR, Buffalo.

THE BACTERICIDAL AND PHOTOCHEMICAL PROPERTIES OF IRRADIATED COD LIVER OIL AND AN OZONIDE OF OLIVE OIL. FRANKLIN A. STEVENS, J. Bact. **32**:47 (July) 1936.

The bactericidal and photochemical properties of oils exposed to ultraviolet rays have been studied by many investigators. Both these effects were, at first, attributed to invisible rays, but recent experimentation has shown that bacteria are killed and photographic films are fogged by vapor from the oils. Stevens investigated the bactericidal properties of irradiated cod liver oil and then the germicidal effects of an ozonide of olive oil. The bactericidal and photochemical properties of the vapors from these oils were correlated. The fogging and bactericidal effects of the vapor from irradiated cod liver oil and from ozonide of olive oil are found to be due to substances liberating active oxygen. Ozonides of olive oil, emulsions of the ozonide in a solution of sodium chloride and in serum and the vapor from ozonides are all germicidal. Not only are bacteria killed by the oxygen liberated from these oils, but their rate of growth may be retarded or dissociation may occur if they are subjected to sublethal doses.

STOESSER, Minneapolis.

IMMUNOLOGICAL POTENCY OF GLOBULIN FRACTION AS PREPARED BY METHYL ALCOHOL PRECIPITATION. FU-TANG CHU and CHI-YUAN CHOU, Proc. Soc. Exper. Biol. & Med. **33**:323 (Dec.) 1935.

Human placentas were extracted with 1 per cent saline solution and the globulin fraction precipitated with methyl alcohol according to the method of Liu and Wu. The precipitated material was dissolved in saline solution, diluted with ether-ethyl alcohol mixture, filtered, washed and dried. The globulin was extracted in a Soxhlet apparatus with anhydrous ether over sodium for twenty-four hours. The dry powder was kept in a desiccator in the icebox and dissolved in 1 per cent sodium chloride solution shortly before clinical use. The immunologic potency was compared with that of the extract made by precipitation with ammonium sulfate. Both extracts have about the same titer of neutralization of Dick toxin. In nine children both extracts were equally potent in the modification of, or the prophylaxis against, measles.

HANSEN, Minneapolis.

THE ACQUIRED RESISTANCE OF FIXED TISSUE CELLS TO CHEMICAL INJURY. W. DEB. MACNIDER, South. M. J. **29**:1189 (Dec.) 1936.

The experiments which the author outlines indicate that an organ may acquire a resistance which is dependent on another and most natural factor, and that as a reaction to injury there may develop within it an altered type of cell which is both functionally effective for it and resistant to certain toxic chemical agents.

SCHLUTZ, Chicago.

Metabolism; Infant Feeding; Milk and Other Foods

STUDIES IN MINERAL METABOLISM (CALCIUM AND THE KIDNEYS). B. CHOWN, Canad. M. A. J. **35**:134 (Aug.) 1936.

Calcium injury of the kidney begins with a laying down of intratubular and peritubular calcium and passes by way of obstruction, dilatation and collapse of tubules and interstitial fibrosis to complete destruction. The major factor is calcium, and the variables in the picture are the height, duration and time of occurrence of the calciuria, the source and hence the physicochemical state of the calcium, the presence or absence of associated hyperphosphaturia and superadded infection. In eight of twenty cases of chronic pyelonephritis evidence suggested an upset in the mineral metabolism, i. e., high blood calcium, bone disease or renal stone. In seven cases of renal rickets an increase in the blood calcium has been found.

MOORE, Omaha.

ALLERGIC MANIFESTATIONS TO COWS' MILK. C. G. KERLEY, New York State J. Med. **36**:1320 (Sept. 15) 1936.

In the past few years Kerley has seen an increasing number of infants and young children with sensitization to cow's milk. He believes that heredity plays a greater part in such a development than has been recognized and reports a family in which sensitization occurred in four generations. He has seen several cases of shock through ingestion of milk, and in one of these, that of a 10 month old infant, death occurred. Scratch tests in cases of shock were invariably negative. In sixty-five cases of eczema there were only five in which skin tests were positive. He believes that the earlier feeding of raw cow's milk in full strength has produced an increase in the number of allergic children. For treatment, evaporated milk cooked one or two hours or skimmed milk cooked from four to six hours is advised.

AIKMAN, Rochester, N. Y.

EMULSIFICATION OF FAT FOR INTRAVENOUS ADMINISTRATION. R. J. MYERS and H. BLUMBERG, Proc. Soc. Exper. Biol. & Med. **35**:79 (Oct.) 1936.

High frequency supersonic waves, generated from quartz crystals by means of the piezo-electric effect, were used to emulsify fat mixtures (lecithin and olive oil). By generating waves with a frequency of 300,000 cycles per second, fine emulsions with a high degree of stability were obtained. The diameter of practically all the visible fat particles was 0.5 micron, and none were larger than 1 micron, even after standing two months. The supersonic radiation has an additional advantage in that it permits autoclaving before the final step in the procedure of emulsification. These emulsions, containing a total of 7 per cent fat, were satisfactory for intravenous use in man.

HANSEN, Minneapolis.

VARIABILITY OF METABOLIC RESPONSE OF DIFFERENT CHILDREN TO A GIVEN INTAKE OF CALCIUM. H. A. HUNSCHER, F. C. HUMMEL and I. G. MACY, Proc. Soc. Exper. Biol. & Med. **35**:189 (Oct.) 1936.

Six children, four of them 5 years old and two 8 years old, were kept on an experimental diet for a long period under ideal conditions. With an intake of 1 Gm. of calcium per day for from twenty-five to sixty-five days the average daily retention of calcium varied from 0.27 to 0.48 Gm. per day or from 0.011 to 0.024 Gm. per kilogram per day. There was marked variation in the same subject at different intervals, also a great difference in the actual retention between similar subjects under the same conditions.

HANSEN, Minneapolis.

THE CAROTENE AND VITAMIN A CONTENTS OF MOTHER'S MILK AT BATAVIA. O. MUELEMANS and J. H. DE HAAS, Indian J. Pediat. **3**:57 (April); 133 (July) 1936.

Muelemans and de Haas report on an investigation to determine the carotene and the vitamin A content of mother's milk from native, Chinese and European women in Batavia by the chemicocolorimetric method. The colostrum of women of all three races contains approximately one and one-half times as much vitamin A substances as there are in milk later in the period of lactation. The daily values for colostrum and for milk later in the period of lactation for native and Chinese women amount to about 600 and 400 international units, respectively. The values for European women are somewhat higher. The prosperity of the mother influences the values to a considerable extent. Both in the colostrum and in the late milk the proportion of the number of international units of vitamin A and of carotene varies from 2:1 to 3:1. The amount of vitamin A substances in mother's milk does not run parallel with its fat content. Cow's milk in Batavia contains approximately 60 international units of vitamin A substances per hundred cubic centimeters.

GONCE, Madison, Wis.

THE ASCORBIC ACID (VITAMIN C) CONTENT OF MOTHER'S MILK AT BATAVIA. J. H. DE HAAS and O. MEULEMANS, Indian J. Pediat. **3**:216 (Oct.) 1936.

By titrating breast milk that had been acidulated with glacial acetic acid with 2,6 = dichlorophenolindophenol the authors found the vitamin C content of the milk of Native and Chinese women throughout the nursing period to be 4 mg. per hundred cubic centimeters, that of European mothers from 6 to 7 mg., and that of cows 1.5 mg. If the content of vitamin C is from 4 to 7 mg. and ± 800 cc. of mother's milk is taken, the suckling absorbs daily from 30 to 50 mg. of cevitamic acid, a quantity equivalent to that contained in approximately 100 cc. of orange juice. In order for the artificially fed infant to acquire a like amount of vitamin C it is necessary to add from 20 to 30 mg. of cevitamic acid to the daily feeding.

GONCE, Madison, Wis.

VITAMIN C AND JUVENILE RHEUMATISM—WITH SOME OBSERVATION ON THE VITAMIN C RESERVES IN SURGICAL TUBERCULOSIS. M. A. ABBASY, N. GRAY HILL and LESLIE J. HARRIS, Lancet **2**:1413 (Dec. 12) 1936.

One hundred and seven patients with active rheumatism, eighty-six in the convalescent stage of the disease and sixty-four controls receiving the same institutional diet were studied.

The diet was a liberal one, sufficient to bring the daily intake of vitamin C well above the "minimum standard" of 25 mg. per day for 10 stone (63.5 Kg.) of body weight. All children weighing more than 3 stone (19 Kg.) received a mininmum of at least one orange a day.

In addition, twenty-three patients with "active" surgical, nineteen with "half-active" and forty-six with "quiescent" tuberculosis were studied.

The control subjects, without exception, excreted more than the "standard" level of 13 mg. of vitamin C for each 10 stone (63.5 Kg.) of body weight per day, the average being 20 mg. per day. The patients with active rheumatism averaged 9 mg. per day; those in the convalescent stage, 10 mg.; those with active surgical tuberculosis, 9 mg., and those with quiescent tuberculosis, 19 mg. In the cases of "half-active" tuberculosis results were intermediary.

It has been found that in a number of other infective conditions, as well as in rheumatic fever, lowered excretion of vitamin C appears, and the view that infection may increase the metabolic need for vitamin C is not a new one. A striking feature, however, of the cases of rheumatism reported is the long-continued persistence of the low figures for excretion of vitamin C, even when, clinically speaking, the disease was quiescent or the patient was convalescent.

LANGMANN, New York.

CLINICAL METHOD OF STUDYING THE NUTRITION OF SCHOOL CHILDREN. P. NOBÉCOURT and G. VITRY, Rev. méd.-sociale de l'enf. **4**:385 (Nov.-Dec.) 1936.

The authors stress the fact that the observations which they report are principally of the physical characteristics of their subjects, for an evaluation of the functions of the various systems would require considerable laboratory work. The clinical approach to the problem embraces observations on the external characteristics, a few anthropologic measurements and an examination of the organs and systems. The assay of the external characteristics suggests nothing new. Among the measurements taken are height, weight and circumference of the chest, and the writers stress the importance of the relation of these figures rather than that of the absolute values. Although no absolute values can be given, and a changing ratio with age is recognized, the authors computed the "Coefficient of Pignet" (sometimes called "coefficient of robustness"). The value is arrived at by subtracting the weight in kilograms, plus the circumference of the chest in centimeters, from the height in centimeters.

If a child is found whose measurements do not display the usual anthropologic relationships or who does not exhibit the usual external evidences of health and no pathologic lesion is found to explain these deviations from normal, a medico-social investigation is instituted.

DIETRICH, Los Angeles.

ON THE HEMOGLOBIN METABOLISM IN INFANTS AND IN NORMAL CHILDREN. ANNA MARIA DORDI and G. ROSSI, Riv. di clin. pediat. **34**:594 (July) 1936.

The stools of breast-fed infants do not contain bilin but contain bilirubin in an almost constant amount. The feces of infants who are artificially fed or are partly breast fed and partly artificially fed contain small amounts of bilin and less bilirubin than do the stools of breast-fed infants. In children over 8 months of age bilirubin is no longer found in the stools; up to the age of 3 years relatively smaller amounts of bilin are found than in adults and between 3 and 7 years relatively larger amounts.

In evaluating the hemoglobin metabolism the hemolytic index as described by Terwen and Greppi has been used. It is equal to $\frac{70}{P} \times \frac{100}{Hb} \times \frac{B}{120}$, when P = body weight, Hb = percentage of hemoglobin and B = the bilin in the stools. The index in normal adults is usually 1; in children under 3 years it is less than 1 and in children of 3 to 7 years over 1.

HIGGINS, Boston.

VARIATIONS IN THE PROTEIN FRACTIONS—CASEIN AND SOLUBLE ALBUMINS—IN WOMAN'S MILK DURING THE COURSE OF A NURSING; THE INFLUENCE OF FAT ON THE PRECIPITATION OF CASEIN. A. BIEBER, Riv. di clin. pediat. **34**:865 (Oct.) 1936.

The protein fractions of the milk are divided into (1) the protein casein, which is precipitated by acetic acid, and (2) the residual soluble protein. The casein seemed to increase and the soluble protein to diminish as the single nursing progressed. If, however, the fat was extracted from the milk before precipitation of the protein, the amounts of the two protein fractions were unchanged as the nursing progressed. It is apparent that the amount of fat in breast milk is a factor in the precipitation of the protein.

HIGGINS, Boston.

THE METABOLISM AND IMPORTANCE OF IODINE IN THE YOUNG ORGANISM: III. THE RELATION BETWEEN THE IODINE OF THE BLOOD AND VITAMINS. C. FIORI, Riv. di clin. pediat. **34**:889 (Oct.) 1936.

Fiori's observations were on animals and birds. Pigeons deprived of vitamin B showed from three to six times as much iodine in the blood as normal pigeons on the same diet but receiving vitamin B. Rabbits showed a similar increase in the iodine of the blood following the giving of an antirachitic diet. Guinea-pigs given a diet low in vitamin C showed slight diminution in the iodine of the blood.

HIGGINS, Boston.

EXPERIMENTAL STUDIES ON THE GALACTOGENIC FUNCTION OF THE PLACENTA. E. MESSERI, Riv. di clin. pediat. **34**:972 (Nov.) 1936.

An extract of human placenta was used. The placenta was first freed from its membrane and broken into small pieces; then it was put in running water for a period of five hours, to wash away as much of the blood as possible. The material was then thoroughly mixed with 10 per cent sodium chloride and spread over a glass plate; it was dried electrically at a temperature not exceeding 35 C.

Doses of 30 centigrams daily of the extract were fed to virgin guinea-pigs. At the end of from four to five days enlargement of the mammary glands was apparent, and at first colostrum, and later milk, could be expressed. The supply

of milk kept up after the extract had been withdrawn. Attempts to feed young guinea-pigs at the breasts of these animals resulted in marked hostility of the foster-mothers to the new-born and were unsuccessful.

The stimulation of the mammary gland, its functional maturation and its secretion of milk seem to be brought on by the hormone of the placenta without the concomitant action of other endocrine glands. HIGGINS, Boston.

VARIATIONS IN THE AMOUNT OF LACTOSE IN MILK OBTAINED AT VARIOUS TIMES DURING A NURSING. C. NOVELLIS DI COARAZZE, Riv. di clin. pediat. **34**:1057 (Dec.) 1936.

The author has plotted curves of the lactose content of human milk during single nursings. The maximum figure for lactose in human milk was 8 per cent; the minimum figure, 5.3 per cent, and the mean figure, 6.55 per cent. The lactose content in 15 of the 20 cases studied followed a definite trend. The lactose would be the highest near the beginning of the nursing; it would fall to reach its minimum after ten minutes and then rise again to a figure not quite so high as that shown at the start of the nursing. The maximum variation in the lactose content in a single case was approximately 1.5 per cent, although the usual variation was approximately 0.5 per cent. HIGGINS, Boston.

INTRA-UTERINE CARBOHYDRATE METABOLISM. BLASIUS SZENDI, Monatschr. f. Kinderh. **66**:128 (July) 1936.

Intra-uterine carbohydrate metabolism in man and in animals was studied with special placental preparations. It was determined that the fertilized egg has a specific center and an automatic mechanism for carbohydrate metabolism. The active center changes its position with the periods of pregnancy and tends to be where the tissues are relatively inactive. In early pregnancy it lies in the decidua. Then it shifts to the fetal lungs, and only in the last half of pregnancy does it move to the liver. It becomes localized there after the seventh to the eighth month.

GERSTLEY, Chicago.

DAILY VARIATIONS IN THE FAT CONTENT OF HUMAN MILK. U. S. RUŽIČIĆ, Monatschr. f. Kinderh. **67**:415 (Dec.) 1936.

It is known that the fat content of human milk varies. To investigate the hypothetic relationship to diet, the writer provided different menus for five nursing mothers. His results show that the daily variations follow no characteristic curve. They depend entirely on the amount of fat in the diet. Three hours after the intake of fat the fat content of human milk increases, reaches a maximum in twelve hours, and decreases during the subsequent twelve hours. Failure to recognize this relationship to the diet is the explanation of so many conflicting results.

GERSTLEY, Chicago.

INFLUENCE OF PROTEIN ON MAMMARY SECRETION. G. PFEIFFER, Ztschr. f. Kinderh. **57**:261 (May 21) 1935.

During a two month period addition of protein in the form of a preparation of tropon and lecithin to a basic diet led to an increase in appetite and in lactation in three goats (15.1 per cent), while lactation in a control animal decreased 16.5 per cent. There was no noteworthy change in the percentage of protein and fat in the milk secreted by the experimental animals. SIEMSEN, Chicago.

TOTAL BLOOD CALCIUM IN NORMAL AND IN SPASMOPHILIC CHILDREN. S. SIWE, Ztschr. f. Kinderh. **57**:368 (July 6) 1935.

By utilizing a method for which only from 0.05 to 0.10 cc. of blood serum is needed, Siwe made numerous determinations of the blood calcium. Normal children

showed from 10 to 13 mg. per hundred cubic centimeters and only moderate fluctuation in the values between morning and evening. In spasmophilic convulsions the blood calcium is usually low, but the sudden fluctuations are more important. The blood calcium may rise sharply after a convulsion. Spasmophilia can never be ruled out definitely by a single normal blood calcium value. Latent tetany is characterized by less marked but more continuous lowering of the blood calcium content.

SIEMSEN, Chicago.

Vitamins; Avitaminoses

ON THE EXISTENCE OF AN INTRINSIC DEFICIENCY IN PELLAGRA: A PRELIMINARY REPORT. V. P. SYDENSTRICKER, E. S. ARMSTRONG, C. J. DERRICK and P. S. KEMP, Am. J. M. Sc. **192**:1 (July) 1936.

The hypothesis is advanced that in pellagra there is an intrinsic deficiency of variable degree. Some persons retain enough intrinsic factor to recover on diets grossly deficient in vitamin B_2. Others are able rapidly to regenerate intrinsic factor in the presence of an abundant supply of extrinsic factor and so recover on high vitamin feeding. Others are totally lacking in intrinsic factor and are unable to regenerate it even under optimum dietetic therapy.

Six cases of pellagra are reported. The patients were treated with gastric juice in varying amounts over a period of ten to forty-nine days. The results are reported, as is the method of maintenance. Gastric juice was administered about four hours after the evening meal.

HENSKE, Omaha.

THE EFFECT OF BREWER'S YEAST ON BLOOD PRODUCTION. IRA A. MANVILLE and JACK W. GRONDAHL, Am. J. Physiol. **116**:626 (Aug.) 1936.

Anemia was produced in rats by subjecting them to low barometric pressure. One group was placed on a vitamin B-free diet and the remainder on a similar diet with varying amounts of brewers' yeast added. On the diet without the vitamin B complex the rats were unable to produce erythrocytes and hemoglobin. The B_1 and B_4 fractions were considered responsible for the beneficial effects.

NOURSE, Cleveland.

STORAGE OF VITAMIN C BY NORMAL ADULTS FOLLOWING A PERIOD OF LOW INTAKE. P. H. O'HARA and H. M. HAUCK, J. Nutrition **12**:413 (Oct.) 1936.

An experiment was planned in order to determine the intake of vitamin C necessary to reestablish saturation after prolonged administration of a diet low in this vitamin. Four normal adult women were used as subjects. Subnutrition in vitamin C was determined by the Göthlin capillary resistance test and by studies of the urinary excretion.

It was found that after a month on a diet low in vitamin C from 2,200 to 2,800 mg. of the vitamin, given in daily doses of 200 mg., was necessary to restore the tissues to a point of saturation. It is suggested that tissue reserves at saturation appear to be of the order of 2,500 to 3,000 mg. During the course of the experiment, the authors found that the capillary resistance test did not give an adequate indication of the state of vitamin C nutrition.

MUNNS, Winnetka, Ill.

THE ANTIRACHITIC VALUE OF IRRADIATED YEAST IN INFANTS. T. G. H. DRAKE, F. F. TISDALL and ALAN BROWN, J. Nutrition **12**:527 (Nov.) 1936.

In preventive tests sixty-nine infants ranging in age from 4 to 7 months were observed over a period of five winter months. These infants received 500 international units of vitamin D daily in the form of irradiated yeast. At the end of the experimental period none of these infants revealed moderate or marked rickets.

In curative tests 1,000 units was sufficient to produce definite healing of marked rickets in one child within one month. Approximately 500 units accomplished the same result in each of four other infants who had moderate or marked rickets.

MUNNS, Winnetka, Ill.

QUANTITATIVE ESTIMATION OF LACTOFLAVIN AND OF VITAMIN B_6 IN COW'S MILK AND IN HUMAN MILK. P. GYÖRGY, Proc. Soc. Exper. Biol. & Med. **35**:204 (Oct.) 1936.

By feeding experiments in rats, György found that human milk and cow's milk contain practically the same amount of the B_6 (rat pellagra) factor. The lactoflavine content of cow's milk, on the other hand, is three times as high as that of human milk. These experiments showed that the low vitamin B potency of human milk, expressed in terms of the whole vitamin B complex, can easily be rectified by adding pure crystalline lactoflavine in sufficient amounts.

HANSEN, Minneapolis.

SUCCESSFUL TREATMENT OF HUMAN PELLAGRA WITH THE "FILTRATE FACTOR." P. J. FOUTS, S. LEPKOVSKY, O. M. HELMER and T. H. JUKES, Proc. Soc. Exper. Biol. & Med. **35**:245 (Nov.) 1936.

Four human subjects with pellagra were cured by administration of a liver filtrate containing the chick antidermatitis factor but free from lactoflavine and rat vitamin B_6. The improvement was dramatic in each instance.

HANSEN, Minneapolis.

THE VITAMIN B COMPLEX. R. A. PETERS, Brit. M. J. **2**:903 (Nov. 7) 1936.

This article cannot be abstracted. To be appreciated it must be read in its entirety.

ROYSTER, University, Va.

STOMATITIS DUE TO VITAMIN B_2 DEFICIENCY. W. R. AYKROYD and B. G. KRISHNAN, Indian J. M. Research **24**:411 (Oct.) 1936.

Stomatitis with erosion of the lips and angles of the mouth has been described by many. In the typical case, white patches are seen at the angles of the mouth, which may extend into the mucous membrane of the cheek. Occasionally the tongue is affected. In two hostels, thirty-two boys and thirty-five girls were examined, and it was found that 50 per cent of the boys and 71 per cent of the girls had stomatitis of this type. The diets were analyzed and found lacking in vitamin B_2. The patients were given dried brewers' yeast, with prompt recovery. Also they recovered with 1.5 ounces (46.6 Gm.) of dried skim milk powder. Cod liver oil had no effect. It was assumed that the condition was due to the lack of vitamin B_2.

LULBY, Toronto, Canada.

THE IODINE OF THE BLOOD OF RACHITIC CHILDREN. G. MACCIOTTA, Riv. di clin. pediat. **34**:933 (Oct.) 1936.

Macciotta made observations on twelve rachitic children. In six of these he was able to observe the iodine of the blood before and after treatment with vitamin D. Confirming the work on animals on a rachitic diet done in the same laboratory, Macciotta found that the iodine of the blood is high in rickets. After treatment it shows a striking drop. The increase is believed to be due not to thyroid activity but rather to the effort of the organism to replace a low content of phosphorus in the blood by a high one of iodine.

HIGGINS, Boston.

THE FACTORS OF VITAMINS IN INFANTILE THERAPEUTICS. G. VIDAL JORDANA, An. de pediat. **1**:557 (Oct.) 1934.

Vidal Jordana mentions a few general considerations on vitamins and then reports in detail twenty interesting cases of avitaminosis from his practice.

HERRON, Spokane, Wash.

CONCERNING THE EFFECT OF VITAMIN A AND VITAMIN C ON THE ALIMENTARY RISE IN BLOOD SUGAR. M. ROLLER, Med. Klin. **32**:1007 (July 24) 1936.

In both diabetic and nondiabetic patients the blood sugar curve rose higher on those occasions when vitamin A (20 to 50 drops of a vitamin A concentrate [vogan]) was included in the meal (0.125 liter of milk and 40 Gm. of white bread) than on those occasions when it was not included. Conversely, the elevation in the blood sugar curve was less (20 to 40) when cevitamic acid (1 to 3 Gm.) was included in the meal of patients with similar conditions. Data are given for four persons in the vitamin A group, for five in the vitamin C group and for only one trial with and without the added vitamin for each person. All were adults. On the basis of these findings Roller postulates an increased cellular activity resulting from the vitamin C and suggests that vitamin C may have a therapeutic value in diabetes.

DOOLEY, New York.

THE INFLUENCE OF VITAMIN C ON ANAPHYLACTIC SHOCK. H. LEMKE, Monatschr. f. Kinderh. **67**:244 (Nov.) 1936.

Lemke noticed that children who had received large amounts of vitamin C seemed less likely to suffer from serum sickness. Observing his material during 1934 and 1935, he treated forty-one children with from 100 to 200 mg. of cevitamic acid by mouth on the days they received diphtheria antitoxin in doses of 1 cc. per kilogram of body weight. In six of these serum sickness developed, while among forty-one control children an exanthem developed in twenty-one. The observations were then repeated experimentally in guinea-pigs and the foregoing hypothesis confirmed. Cevitamic acid protected guinea-pigs when these were given injections of doses of serum which were fatal to the control animals.

GERSTLEY, Chicago.

VITAMINS AND IMMUNITY. H. J. JUSATZ, Ztschr. f. Immunitätsforsch. u. exper. Therap. **88**:472, 1936.

Rabbits that received food of sufficient calories but without vitamins showed a drop in the bactericidal properties of their blood and very poor precipitin response to injections of horse serum. Vitamin A did not improve the aforementioned properties. Small quantities of vitamin D raised the bactericidal properties of the blood but did not affect the antibody response, while large quantities influenced both properties adversely. The water-soluble vitamin B, in the form of yeast, had no influence on the bactericidal properties of the blood serum against staphylococci or on the formation of precipitin. Vitamin C, the natural and the synthetic product, as well as its sodium salt, effected a marked though transient increase of the bactericidal properties of the blood serum and enhanced greatly the production of precipitins, particularly if the vitamin was injected immediately preceding the injection of the horse serum or if it was mixed with it.

DAVIDSOHN, Chicago. [ARCH. PATH.]

HYPOVITAMINOSIS A. C. FRIDERICHSEN and C. EDMUND, Hospitalstid. **79**:1081 (Oct. 13) 1936.

By a special method of measuring the reflex irritability of the eye to light in children below 2 years of age, a quantitative expression was obtained for the vitamin A balance of the organism.

Infants with lowered reflex irritability were restored to normal by administration of vitamin A preparations, and in this way the degree of avitaminosis A was

determined. A dried spinach preparation seemed to be the most effective of several preparations employed. Simultaneously with the effect on the reflex irritability of the eye for light, a distinct effect on the psychic condition of the child was noticed.

ELGHAMMER, Chicago.

THE CONSUMPTION OF VITAMIN C. H. J. VAN WERSCH, Nederl. tijdschr. v. geneesk. **80**:3653 (Aug. 8) 1936.

Van Wersch used the method of van Eekelen (Dissert., Utrecht, 1936) for the determination of the daily expenditure of vitamin C. With this method he found: 1. The daily consumption in himself (72 Kg., 168 cm., 38 years of age) was 56 mg. 2. The daily consumption in a woman (53 Kg., 136 cm., 18 years of age) with skeletal abnormalities, in whom general avitaminosis was suspected to have been present all her life, amounted to 44 mg. In accordance with the body weight (calculated from the author's values), a daily use of 41 mg. had to be expected. These values are in good accordance with those found by van Eekelen (male, 90 Kg., 178 cm., 30 years of age), e. g., 63 mg. daily.

VAN CREVELD, Amsterdam, Netherlands.

Hygiene; Growth and Nutrition; Public Health

RELATION OF PHYSICAL DEFECTS TO NUTRITIONAL IMPAIRMENT, BASED ON THE EXAMINATION OF THIRTY THOUSAND CHILDREN OF TWENTY-ONE STATES: PHYSICAL MEASUREMENT STUDIES NO. 5. WILLIAM M. GAFAFER, Am. J. M. Sc. **192**:669 (Nov.) 1936.

Examination of approximately 30,000 white children aged from 6 to 14 years, of 21 states (representing chiefly the northeastern and central regions of the United States), showed that about one half of the children had one or more recorded physical defects, in most instances carious teeth, defective tonsils and adenoids.

The nutritional status of 6.5 per cent of the boys with physical defects was judged to be poor or very poor, while the percentage for the physically nondefective was 3.8. The corresponding percentages for girls were 10.2 and 5.4, respectively. The difference between the percentage for the physically defective and that for the physically nondefective is statistically significant for both sexes.

The evidence presented is of sufficient weight to indicate that physical defects, such as carious teeth, defective tonsils and adenoids, are associated with nutritional impairment.

HENSKE, Omaha.

STATISTICAL STUDY OF THE SEX RATIO AT BIRTH. W. T. RUSSELL, J. Hyg. **36**:381 (July) 1936.

The biologic factor responsible for the constant excess of male births over female births has never been satisfactorily explained. Statistics on several million births dating in part since 1629 are reviewed. They are taken mostly from British areas, but other countries are considered. The influence of density of population, season, geographic distribution, illegitimacy, age of parents, war, cross-breeding, migration and social status is considered.

Despite the predominance of male fetuses lost from abortions and miscarriages (with a uterogestation of less than four months the sex ratio was as high as 3,755, for the 4 to 6 month period 1,426, from 7 to 9 months 1,293), the sex ratio in different nations at different times runs from 1,030 to 1,080 males per thousand females. The sex ratio is distinctly lower in urban than it is in rural districts; Russell explains this by the belief that there are more abortions in urban areas and since these run high in sex ratio the excess of males born alive is depleted. Geographic conditions were not found to be of influence. In the United States the ratio was definitely highest in the second quarter of the year. In England

no seasonal variation was noted. No information was found to show that marriage of different nationals or cross-breeding influences the sex ratio. After the Great War the sex ratio was higher for a number of years, more in belligerent than in neutral countries. The ratio is highest among first-born children and decreases as the size of the family increases. The index decreases with descent in the social scale. There is no definite evidence that the age of the parents influences the ratio, but possibly the age of the father does have some influence. The total sex ratio for stillbirths in England and Wales is approximately 20 per cent higher than that for live births.

JANNEY, Wauwatosa, Wis.

STUDIES IN THE DECLINING BIRTH RATE, WALES AND SOUTH ENGLAND. W. J. MARTIN, J. Hyg. **36**:402 (July) 1936.

For a generation there has been a decline in the birth rate in most European countries, accentuated since the war. An extensive study of this decline in Wales and Southern England since 1850 is presented together with a consideration of possible influences. The birth rate is based on the number of legitimate births per thousand married women between the ages of 15 and 45. The decline has been steadily increasing, so that in 1930 and 1932 the fertility was less than 50 per cent of that of sixty years ago.

Change due to the later age of marriage more recently is not considered a significant factor. Occupation and economic conditions are definitely influencing factors. In general, the range of the number of births per thousand married women was formerly (1860 to 1862) from 270 to 320, and is now from 110 to 130. As yet it has not resulted in a decrease in the population of the country. This has been prevented in part by the decreasing mortality rate. Approximately, a birth rate of 163 per thousand married women, or 2.9 children per family, is necessary to maintain a stable population.

JANNEY, Wauwatosa, Wis.

ON THE ACTION OF CEREBROSPINAL FLUID OF THE HORSE IN SOME DYSTROPHIC STATES IN INFANCY. I. BIDDAU, Riv. di clin. pediat. **34**:601 (July) 1936.

Biddau used injections of cerebrospinal fluid from a horse as a means of improving the general condition of dystrophic infants and leading to a gain in weight. From 3 to 5 cc. was injected daily or every other day. In thirteen of the eighteen children the gain in weight and the clinical improvement were striking and almost immediate. Biddau expresses the belief that the benefit may be due to hormones in the cerebrospinal fluid.

HIGGINS, Boston.

Prematurity and Congenital Deformities

IMPERFORATE ANUS WITH RECTOVAGINAL CLOACA. H. B. STONE, Ann. Surg. **104**: 651 (Oct.) 1936.

Rectovaginal cloaca of congenital origin with imperforate anus is a well known but rare anomaly. It is associated with incontinence of feces and gas in many instances but rarely with an obstruction that calls for surgical relief in the early hours of life. It is amenable to very satisfactory surgical correction. It is advisable to defer operation until the child approaches puberty.

The operative procedure is described.

BANTIN, Omaha.

HERNIA INTO THE UMBILICAL CORD AND RELATED ANOMALIES. L. ALBERT THUNIG, Arch. Surg. **33**:1021 (Dec.) 1936.

Hernia into the umbilical cord, or true congenital umbilical hernia, is a comparatively uncommon anomaly. It is said to occur once in every 5,000 or 6,000 new-born infants. A case is reported in which a hernia into the umbilical cord existed in a premature infant weighing 3 pounds, 2 ounces (1,363 Gm.). The infant was operated on forty minutes after birth and made a complete recovery.

The article deals with the anatomic structures of the human embryo and their connection with the umbilical cord and the gastro-intestinal tract. The technic of the surgical procedure is also carefully described.

KAISER, Rochester, N. Y.

GENEALOGICAL STUDY OF A CASE OF SYMMETRICAL CONGENITAL BRACHYDACTYLIA. WILLIAM ROBERT STECHER, M. Rec. **144**:5 (July 1) 1936.

Stecher discusses (1) the types of abnormalities of hands and feet, (2) sites of predilection for the occurrence of brachyphalangia, (3) cause of brachyphalangia and (4) polydactylism. He reports a case of a woman whose two brothers, father, a grandfather and three children, two boys and a girl, all showed abnormalities of the digits. The report is accompanied by roentgenograms of the hands and feet of the patient and of the hands of two of her children. In conclusion the author states that since the condition is hereditary it is due to a primary lack or origin of the anlagen, rather than to a disease which destroys the skeletal anlagen after differentiation has begun.

WILLIAMSON, New Orleans.

SIMPLE MILK MIXTURES IN THE FEEDING OF PREMATURE INFANTS. A. TOW, New York State J. Med. **36**:1394 (Oct. 1) 1936.

Formulas composed of simple dilutions of cow's milk with from 8 to 17 per cent dextrimaltose gave excellent results in the feeding of premature children; from 1 to 3 per cent calcium caseinate was also added.

AIKMAN, Rochester, N. Y.

SOME REMARKS ON CLEFT PALATE AND HARELIP. HUGH GIBSON BEATTY, West Virginia M. J. **32**:501 (Nov.) 1936.

Harelip and cleft palate occur infrequently. They are seldom seen in the Negro, but they may occur anywhere and among any people and always have. They occur also in lower animals. Heredity plays a part in the etiology of the conditions. The embryologic development of these defects is explained and illustrated. The effects of these deformities are cosmetic, psychic and functional. The defects are classified and tabulated according to the various types and degrees of deformity.

Treatment, which is obviously surgical, is discussed in relation to age of the patient, method, etc. Since the conditions involve no emergency, patients should be put in the best possible physical condition before operative treatment is undertaken.

SHAWKEY, Charleston, W. Va.

GARGOYLISM (CHONDRO-OSTEO-DYSTROPHY, CORNEAL OPACITIES, HEPATOSPLENOMEGALY, AND MENTAL DEFICIENCY). R. W. B. ELLIS, Proc. Roy. Soc. Med. **30**:158 (Dec.) 1936.

This condition was reported in a child of 21 months who could not stand without support, could not feed himself or say any words intelligibly. The results of the physical examination, investigations and roentgenologic examination and reproduction of photographs of the patient and of the x-ray plates accompany the report.

In his comment, Ellis states that the patient showed the complete syndrome described as gargoylism. The literature contains reports of about twenty examples of this syndrome. The patients resemble one another closely, each having a large head, heavy features, a depressed nasal bridge, a purulent discharge and coarse eyebrows. Enlargement of the liver and spleen is almost constant and has suggested that a metabolic disturbance (possibly comparable with Gaucher's disease) is the responsible factor. In several instances the disease has been familial. The bone changes have many features in common with Brailsford-Morquio disease.

WILLIAMSON, New Orleans.

DEGENERATION OF THE AMSTERDAM TYPE: REPORT OF A CASE. R. VEDDER, Arch. de méd. d. enf. **39**:665 (Oct.) 1936.

In 1933, Cornelia de Lange reported two instances of a new type of degeneration found in Amsterdam and now known as typus degenerativus amstelodamensis. These children presented the following characteristics:

1. Dwarfism with normal proportions from birth.

2. Microcephaly; brachycephaly.

3. A typical facies: very thick eyebrows, meeting in the median line; extremely long eyelashes; a small nose with conspicuous nostrils; small mandibles, and ears set rather low.

4. Small hands and feet; the thumb placed more proximately than normal and commonly held in the palm of the hand; incurvation of the short right little finger; syndactilism of certain toes.

5. Mental retardation.

A third case of this unusual disorder is reported from Amsterdam in a girl of 10 years, who exhibited precisely in every detail the syndrome described by de Lange.

AMESSE, Denver.

HYPERTELORISM OF GREIG (PARETIC AND HEREDITARY TYPE). LUDO VAN BOGAERT and JACQUES SWEERTS, J. belge de neurol. et de psychiat. **35**:71 (Feb.) 1935.

Hypertelorism is associated with a craniofacial congenital deformation, which consists essentially of abnormal separation of the orbits. The nasal bridge is large, and the bones which comprise it are hypertrophied. There may be in addition a reduction in the height of the frontal bone and a flattening of the occipital bone. The complete form is rare. The mild type is rather frequent. The two cases reported in this article are the eleventh and twelfth to be reported in the literature. Apparently this condition is frequently associated with other extraneural anomalies. Some patients suffer from convulsive attacks and mental retardation.

WAGGONER, Ann Arbor, Mich. [ARCH. NEUROL. & PSYCHIAT.]

PROTECTION OF CHILDREN BY THE DEPARTMENT OF THE SEINE AND RÔLE OF THE VISITING NURSE. J. FRANCESCHINI and R. H. HAZEMANN, Rev. méd.-sociale de l'enf. **4**:399 (Nov.-Dec.) 1936.

The paper gives a long and fairly detailed account of the organization and objectives of the various agencies provided for the maintenance and improvement of infant and child welfare by the Department of the Seine. The need for a system as ambitious as that described is indicated by the fate of 436,000 infants born in 1894. When in 1914, at the age of 20, they were called for enlistment, it was learned that 27 per cent had already died. Another 22 per cent were unfit for military service.

Throughout the organization of the various agencies there is a true liaison between the political administrators, the social workers, the visiting nurses and the doctors in the clinic. The scope of the work is tremendous, and always the visiting nurse is the spearhead of the attack. Her rôles are legion; her responsibility is great. Besides the usual duties of visiting sick mothers and children, she is expected to give actual care to patients with minor illnesses, to recognize tuberculosis and congenital syphilis in the early stage, to disseminate propaganda on vaccination and to perform her duties and conduct herself in such a way "as to be a moral example for the community." One particularly interesting item in the whole program is the regular provision of monetary aid for prospective and convalescent mothers, so that they will not be forced to work during those critical periods just before and after delivery.

DIETRICH, Los Angeles.

IMPERFORATE ANUS WITH A PERINEOSCROTAL FISTULA. C. DA GAMA, Pediat. e puericultura **5**:20 (Sept.-Dec.) 1935.

A case is described, and photographs are shown. SANFORD, Chicago.

TREATMENT OF PREMATURE INFANTS WITH HORMONES, COLOSTRUM AND PREGNANCY SERUM. A. DAPSY, Monatschr. f. Kinderh. **67**:146 (Oct.) 1936.

Dapsy reasons that the premature infant is born with a deficiency of mineral matter, protein, hormones and various other vital necessities. Breast milk is not rich enough in these ingredients to make up the deficiency. He therefore tried to cover up the deficit by providing a host of hormones of various names unknown in this country as well as by feeding colostrum and giving human blood serum. He concludes that pregnancy serum and colostrum are of special value.

GERSTLEY, Chicago.

A CASE OF LITHOPEDION. C. EFTIMIE and S. MARIN, Spitalul **56**:395 (Oct.) 1936.

There was present a tumor of the right iliac fossa of the volume of the fetal head. This was hard, ovoid, nonfluctuating and adherent to the neighboring organs. On opening the tumor after its extirpation, it was noted that it was formed by the skeleton of a calcified embryo dating from eight years previously.

FROM THE AUTHORS' SUMMARY.

THE KLIPPEL-FEIL SYNDROME (DYSTROPHIA BREVICOLLIS CONGENITA). JORGEN E. THYGSEN, Hospitalstid. **79**:729 (July 21) 1936.

A review of the literature shows great confusion among the various authors in regard to the Klippel-Feil syndrome.

Thygsen describes in detail a case of involvement of this type, illustrating the common anomalies associated with deformities of the cervical and lumbar vertebrae as well as of the costovertebral articulations. ELGHAMMER, Chicago.

SYMPODIA. S. VAN DAM, Nederl. tijdschr. v. geneesk. **80**:4603 (Oct. 10) 1936.

Sympodia is a congenital malformation in which only one lower extremity is present. According to the number of skeletal pieces in the one lower extremity, different forms of sympodia are distinguished. The many theories regarding the cause of this malformation are mentioned. Van Dam gives and illustrates the results of an extensive anatomic examination of a monster showing sympodia. This examination was performed especially to test the theory of Bolk (1899) that sympodia is a pathologic segmental anatomic symptom. The conclusion is, with some reservation, that the examination confirmed the theory of Bolk.

VAN CREVELD, Amsterdam, Netherlands.

New-Born

CARCINOMA OF THE TONGUE IN A NEWBORN CHILD. L. W. FRANK, C. D. ENFIELD and A. J. MILLER, Am. J. Cancer **26**:775 (April) 1936.

This is the first recorded case of carcinoma of the tongue in a new-born infant. Histologic examination showed the lesion to be a squamous cell carcinoma. It healed after roentgen therapy and had remained healed for two years when the report was made. FOERSTER, Milwaukee. [ARCH. DERMAT. & SYPH.]

NEOPLASTIC EXTRACRANIAL TUMOR OF THE NEW-BORN. V. J. DARDINSKI and M. D. DELANEY JR., Arch. Pediat. **53**:659 (Oct.) 1936.

A female infant was born with a tumor attached to the head, in the region of the posterior fontanel, by a pedicle 2 cm. in diameter and 3 cm. long. The

tumor measured 10 by 14 by 8 cm. One hour after delivery of the infant the tumor was removed. It weighed 494 Gm.

Microscopic examination of the tumor showed numerous small and a few dilated spaces separated by medium-sized fusiform cells arranged in a disorderly manner. In some areas the cells were flattened and had a definite perivascular arrangement. Most of the spaces were filled with a pink-staining homogeneous substance in which no cellular elements could be detected. The cells forming the tumor appeared to be uniform in size, with vesicular nuclei. No mitotic figures were found.

The exact origin of the tumor was not determined. ORR, Buffalo.

DISCUSSION ON THE PREVENTION OF NEO-NATAL DEATH, INJURY, AND DISEASE. N. B. CAPON and others, Proc. Roy. Soc. Med. **29**:1189 (July) 1936.

Dr. Capon gives tables showing the infant mortality rate, neonatal mortality and stillbirth rate for England and Wales for the years 1932 and 1933. He states that the maternal death rate is low, that the infant mortality rate has dropped to 54.4 per cent of that for the period from 1906 to 1910, that the neonatal death rate has fallen only to 80.1 per cent of that for the same period and that the mortality is approximately as great in the first month of life as in the remaining eleven months of the first year. He then gives statistics regarding the neonatal deaths that occurred during twelve years in the Liverpool Maternity Hospital. He discusses briefly neonatal prophylaxis and the chief causes of neonatal death.

Dr. Letitia Fairfield gives statistics on the neonatal deaths which occurred in the London County Council's maternity wards in 1935. She states that few babies die in the hospital after the first seven days. Of 296 babies dying in that hospital in the first ten days of life 225 were premature. She says that neonatal mortality is an amalgum of two great groups of factors—the prenatal and intranatal factors and the ordinary environmental factors: infectious, gastro-intestinal and respiratory.

She discusses these factors and gives a table showing the numbers of stillbirths and neonatal deaths in relation to the type of labor.

Dr. Gilbert I. Strachan states that investigation of the figures in the Cardiff Royal Infirmary for the last five years showed that neonatal death is only one third as common as stillbirth.

Clinically, the condition most commonly associated with neonatal death is prematurity.

In analysis of a series of fifty neonatal deaths occurring in the Cardiff Royal Infirmary the following main associated clinical conditions were found to be present: complications of labor, prematurity, congenital fetal disease, antepartum hemorrhage, toxemia of pregnancy and syphilis. Strachan discusses these conditions and gives suggestions as to what the obstetrician may do to lower the neonatal death rate.

Dr. Ethel Cassie states that the infants dying in the first month of life give 52 per cent of the total infant mortality rate. The loss from stillbirths is heavier than that from neonatal deaths; the two together give a formidable total. Environmental factors seem not to influence the number of stillbirths or of neonatal deaths. The poorest district of Birmingham shows no preponderance of stillbirths and neonatal deaths. She gives tables showing causes of stillbirth and neonatal death and draws the conclusion that antenatal and obstetric factors are mainly responsible for this enormous loss of life and says that it can be reduced by improved obstetric care and improved neonatal care.

Dr. E. A. Barton states that in studying the question of the best way of giving artificial respiration to asphyxiated babies he became interested in the state of the larynx and trachea of the baby before it breathes. He performed autopsies on some stillborn babies and dissected out the larynx and the trachea.

He found that the glottis was closed and the trachea was flattened like a deflated tire. Therefore, Sylvester's method or, indeed, any other is a waste of time until the glottis is open and the trachea has become a patent tube. If the

infant has made no effort to breathe, the glottis must be artificially opened and the walls of the trachea artificially separated before any attempt is made to give artificial respiration. He has tried to do this by passing a tube through the larynx and into the trachea. Also, he has tried blowing into the baby's mouth.

WILLIAMSON, New Orleans.

THE PREVENTION AND TREATMENT OF ATELECTASIS IN THE NEWBORN CHILD, WITH PARTICULAR REFERENCE TO THE USE OF A NEW INCLINED RECEIVING TABLE. J. B. BLAIKLEY and G. F. GIBBERD, Proc. Roy. Soc. Med. **29**:1205 (July) 1936.

Blaikley and Gibberd state that when the respiratory efforts are feeble a little viscid mucus in a bronchus will make impossible the already difficult task of aerating the unexpanded lung. In experiments on curarized cats Murphy has shown that it is impossible for them to inhale mucus and fluid if they are placed head downward on a plane inclined 15 degrees from the horizontal. They then describe a table they have made for keeping the new-born baby in that position.

They state that from experiments on the lungs of stillborn babies they have found it requires a pressure of 20 cm. of water to obtain complete expansion of the lungs.

Using intratracheal catheters they found that this pressure was obtained by delivering the mixture of oxygen and carbon dioxide at a pressure of 35 cm. of water in the catheter. They do not recommend this method to be used indiscriminately.

WILLIAMSON, New Orleans.

CONGENITAL ICTERUS GRAVIS. J. RAVINA, Nourrisson **24**:227 (July) 1936.

A case is reported of a girl who was born intensely icteric and died on the third day. On several occasions in the pregnancy the mother had had colon bacilli in the urine. Before death colon bacilli had been cultured from the baby's urine. Necropsy revealed a large liver, weighing 250 Gm., with the histologic picture of subacute inflammation. The biliary passages were patent. This sequence of bacilluria in mother and baby, the author believes, can be explained by transplacental passage of the pathogenic bacilli from mother to offspring.

MCCLELLAND, Cleveland.

Acute Contagious Diseases

IS THERE ANY RELATIONSHIP BETWEEN RESISTANCE AND SUSCEPTIBILITY TO POLIOMYELITIS AND DIPHTHERIA? CLAUS W. JUNGEBLUT, Am. J. M. Sc. **192**:661 (Nov.) 1936.

In a series of neutralization tests with 16 samples of antitoxic serums obtained from horses immunized against diphtheria toxin, complete inactivation of the virus of poliomyelitis occurred with four samples and partial inactivation with one sample. There was no consistent relation between antitoxic potency as expressed in unitage, and extent of virucidal power.

Three monkeys which survived a full course of active immunization against diphtheria were protected against intracerebral infection with the virus of poliomyelitis. On reinfection slight paresis developed in two animals; the third remained free from any symptom of the disease.

Substances active against the virus of poliomyelitis, although occasionally demonstrable in the serums of diphtheria-immune monkeys, appear with marked irregularity and show no correlation to the degree of antitoxic immunity. Their concentration, at best, is only weak.

The problem of nonspecific resistance and susceptibility to diphtheria and poliomyelitis is discussed in the light of clinical and pathologic observations.

HENSKE, Omaha.

THE KNOWN AND UNKNOWN OF PERTUSSIS VACCINE. L. SAUER, Am. J. Pub. Health **25**:1226 (Nov.) 1935.

Sauer reviews his work with pertussis vaccine. This vaccine is made from recently isolated antigenic strains grown on mediums containing human blood. From 7 to 8 cc. of vaccine containing 10,000,000 organisms per cubic centimeter is given in three doses at weekly intervals. Only ten (8 per cent) of 127 children known to have been exposed contracted pertussis. The average interval between injection and exposure was eight months. It is emphasized that pertussis vaccine is an immunizing, not a curative, agent. He believes that certain occurrences immediately after inoculation with pertussis vaccine, such as diseases or other immunizations, may interfere with the immunity response.

McBRYDE, Durham, N. C.

THE IMMUNIZING PROPERTIES OF UNDILUTED AND DILUTED DIPHTHERIA FORMOL-TOXOID. W. A. TIMMERMAN and A. C. BRANDWIJK, Brit. J. Exper. Path. **17**:252, 1936.

The immunizing power of a fixed quantity of a certain diphtheria toxin digested with dilute solution of formaldehyde is dependent on the total amount of fluid in which it is injected into the animals. During a period up till eight weeks after immunization, the animals given injections of undiluted toxoid are less immune than those immunized with diluted toxoid. The experiments of Timmerman and Brandwijk make it doubtful whether this condition remains unaltered at a later period after the immunization.

FROM THE AUTHORS' SUMMARY. [ARCH. PATH.]

ACTIVE IMMUNIZATION AGAINST DIPHTHERIA. H. C. MAURICE WILLIAMS, J. D. DEAR and W. STEWART, Brit. M. J. **2**:1078 (Nov. 28) 1936.

After a study of a series of children, the majority of whom were less than 10 years of age, immunization was practiced with toxoid-antitoxin floccules (T. A. F.), toxoid-antitoxin mixture (T. A. M.) and alum-precipitated toxoid (A. P. T.). Few, if any, of the children immunized were given the Schick test prior to the injection, because of the lack of time, but all were given it later. The authors conclude that the "one shot" method of immunization is much less certain than the three injections of toxoid-antitoxin floccules or toxoid-antitoxin mixture. Severe diphtheria is possible after either method of immunization, but no cases of severe involvement have occurred in which immunity was confirmed by subsequent Schick test.

ROYSTER, University, Va.

NEUROTROPIC INFECTIONS IN CHILDREN. A. IANCU, Arch. de méd. d. enf. **39**:659 (Oct.) 1936.

As early as 1670, Sydenham observed unusual nervous phenomena supervening in cases of measles. A fairly complete review of the literature concerned with the development of encephalitis and encephalomyelitis as a sequel to vaccination, measles, varicella and scarlet fever is presented as an introduction to the clinical report a further case. The invasion concerned a girl of 2 years, who suddenly presented hyperpyrexia, with convulsions, on the seventeenth day after the onset of measles. The subsequent data are reported in full; although the child survived the attack of encephalitis, gross damage was sustained by the central nervous system, and in addition a normal intelligence quotient was reduced, at the age of 11, to a coefficient of 33. Pronounced changes in character were also recorded.

AMESSE, Denver.

SUBCUTANEOUS EMPHYSEMA IN THE COURSE OF UNCOMPLICATED MEASLES. J. FERRAND and M. TURLOTTE, Gaz. d. hôp. **109**:1385 (Oct. 7) 1936.

On the sixth day of measles in a 6 year old girl sudden emphysema of the face and neck was noted, with labored respiration and rapid heart action. The

subcutaneous emphysema progressed for a day and a half and reached as far down as the Poupart ligament. Auscultation of the lungs was impossible because of crepitation under the skin. Roentgen examination showed no pneumothorax or displacement of the heart; therefore it was postulated that pleural adhesion had previously existed in the place where the lung ruptured, allowing the air from the alveoli to escape directly under the skin.

KAJDI, Baltimore.

EXANTHEMA SUBITUM. CESAR PERNETTA, J. de pediat., Rio de Janeiro **3**:493 (Nov.) 1936.

Exanthema subitum is described, and the points at which it differs from other exanthems are set out. The most characteristic difference is the onset of the rash after the fall in temperature.

SANFORD, Chicago.

OCULAR COMPLICATIONS OF VACCINATION. C. SPINOLA, Pediat. e puericultura **5**:17 (Sept.-Dec.) 1935.

The complications of corneal and conjunctival ulcer are discussed, and the literature is reviewed.

SANFORD, Chicago.

RELATIONSHIP OF WEATHER CONDITIONS TO POLIOMYELITIS IN THE STATE OF NEW YORK. W. F. PETERSON and FLORENCE BENELL, Bioklimat. Beiblätter **4**:160, 1935.

The physiologic status of the vascular system is influenced by changes in barometric pressure, humidity and temperature, by storms and by various other climatic conditions. Bacteria of the upper respiratory tract possess greater power of penetration when meteorological conoditions are unfavorable. Analysis of large groups of cases of poliomyelitis in Philadelphia, Chicago and especially the state of New York reveals an association between each polar episode and the outbreak of symptoms of this disease.

STENN, Chicago. [ARCH. PATH.]

DEPOSITION OF UREA IN THE BRAIN IN DIPHTHERIA. W. MÜLLER, Virchows Arch. f. path. Anat. **297**:141, 1936.

Examination of the brain in fifteen fatal cases of diphtheria by means of the xanthydrol reaction for urea revealed the presence of urea in such quantities as are usually seen only in extreme grades of uremia. There was not sufficient renal damage to account for so great a deposition of urea in the brain. Increased formation of urea resulting from the increased metabolism in diphtheria is held to be the main factor in the cerebral deposition of the substance.

SCHULTZ, Evanston, Ill. [ARCH. PATH.]

THE GENESIS OF DIPHTHERIA WITH ESPECIAL REGARD TO THE VIRULENCE OF TYPES OF DIPHTHERIA BACILLI. M. GUNDEL and NIYAZI ERZIN, Zentralbl. f. Bakt. (Abt. 1) **136**:24, 1936.

The authors investigated the invasive and toxicogenic powers of ten strains of diphtheria bacilli of the types gravis, intermedius and mitis when injected subcutaneously into guinea-pigs. Bacilli of the gravis type exhibited high toxicity and marked invasive potentiality, as shown by their rapid dissemination to many organs. Bacilli of the intermedius type were somewhat less toxic, but in fatal infections they were usually cultured from various internal organs. Bacilli of the mitis type led to delayed deaths and were usually absent from the viscera. The authors were impressed by the frequent recovery of diphtheria bacilli from the tonsils after subcutaneous injection (in 32 of 140 guinea-pigs tested); they discuss the relationship of this finding to the possible rôle of the tonsils in the dissemination of diphtheria bacilli through the lymphatic vessels in anginal diphtheria.

CANNON, Chicago. [ARCH. PATH.]

PREVENTION OF POSTSCARLATINAL NEPHRITIS. Y. HIRO, Ztschr. f. Kinderh. **57**: 278 (May 21) 1935.

It seems likely that the detoxifying function is included in the disturbance of liver function which occurs in scarlet fever. The finding by several writers that postscarlatinal nephritis is encountered more often in patients fed milk exclusively than in those on a general diet may be due to burdening of a damaged liver with milk fat.

In view of the apparent rôle of the liver in the pathogenesis of postscarlatinal nephritis, Hiro treated thirty-five patients who had scarlet fever with a liver preparation. In one of these (3 per cent) nephritis developed. Of sixteen who were not treated with liver, nephritis developed in two (13 per cent).

SIEMSEN, Chicago.

CONTRIBUTION TO THE PATHOLOGIC PICTURE IN EXPERIMENTAL POLIOMYELITIS. T. ISIZIMA, Psychiat. et neurol. jap. **40**:18 (March) 1936.

Twenty-one monkeys which received intracerebral injections of poliomyelitis virus were studied clinically and histologically. The histologic changes are divided into three stages: (1) the stage of primary parenchymal dissolution with loss of ganglion cells only and absence of mesodermal reactions, (2) the leukocytic stage, (3) the transitional stage from leukocytes to microglia cells and (4) the microglial phase. Lymphocytic infiltration is purely secondary. The microglial stage may persist a long time. The localization of the process is intimately associated with the vulnerability of the tissue. The medulla and spinal cord are most affected. These are followed in order of vulnerability by the cerebellar nuclei, the midbrain, the interbrain and the cerebral cortex. The striatum and cerebellar cortex are but little affected. After intracerebral injection of virus, changes are noted in the medulla and cord in from one to three days and in the cerebral cortex after from six to seven days.

ALPERS, Philadelphia. [ARCH. NEUROL. & PSYCHIAT.]

THE COURSE OF PASSIVE IMMUNITY AFTER TREATMENT WITH ANTIDIPHTHERIA HORSE SERUM. E. MADSEN, Acta path. et microbiol. Scandinav. **13**:103, 1936.

Blood from fifteen patients with diphtheria was studied for (*a*) diphtheria antitoxin, by the Jensen method (Jensen, Claus: *Acta path. et microbiol. Scandinav.*, supp. 14, 1933) and (*b*) antihorse precipitins. Five of the patients were given the antitoxin intravenously, seven intramuscularly and three in both ways. While in rabbits there was a characteristic sudden very rapid drop of the antitoxin, beginning around the sixth or seventh day after the injection of the antitoxin and about two days before the appearance of the antihorse precipitins, in man the disappearance of the antitoxin was gradual. In four patients serum disease was observed on the eighth (two cases), eleventh and fourteenth days after the injection of the antitoxin. In only one of them was an accelerated loss of the antitoxin noted, corresponding with the onset of serum disease. In only two of them did precipitins appear in the circulation. In none of the patients without serum disease did precipitins appear. Considerable amounts of antitoxin were found in the circulation as late as four weeks after its injection, indicating longer duration of the antitoxic immunity than is commonly reported. The intravenous route is recommended because, after intramuscular injection, a few days are required before the maximum quantity of antitoxin is present in the circulation.

DAVIDSOHN, Chicago. [ARCH. PATH.]

Acute Infectious Diseases

TYPHOID FEVER IN CHILDREN—A PROBLEM IN DIAGNOSIS. WALTER F. BOPP, Arch. Pediat. **53**:777 (Dec.) 1936.

Three cases of typhoid fever are reported. In two cases the appearance was that of a typical surgical condition, and in one, that of lobar pneumonia, before the correct diagnosis was established.

ORR, Buffalo.

RESEARCHES ON TETANUS: V. DISTRIBUTION AND FATE OF TETANUS TOXIN IN THE BODY. JOHN J. ABEL, E. A. EVANS JR. and BETTYLEE HAMPIL, Bull. Johns Hopkins Hosp. **59**:307 (Nov.) 1936.

In this paper the authors endeavor (1) to learn to what extent tetanus toxin accumulates in the blood and the lymph of different species of animals pari passu with the injection of increasing amounts of it; (2) to learn something about the relative ability of the different species of animals to bind and dispose of the toxin in such a manner that it will be no longer recoverable from their organs, and (3) to estimate the bearing of the information obtained in these and in other experiments on a rational theory concerning tetanus.

This paper is important and should be read by those interested in the disease. It is too long to be summarized satisfactorily. LYTTLE, New York.

REDUCED ASCORBIC ACID CONTENT OF BLOOD PLASMA IN RHEUMATIC FEVER. J. F. RINEHART, L. D. GREENBERG and A. U. CHRISTIE, Proc. Soc. Exper. Biol. & Med. **35**:350 (Nov.) 1936.

The cevitamic acid content of the plasma is almost uniformly lowered in acute rheumatic fever. In four cases of uncomplicated chorea the values were normal. The level of cevitamic acid in the plasma usually parallels the intake of vitamin C. In some cases of acute rheumatic fever the response to oral administration of vitamin C, even in large doses, is refractory. HANSEN, Minneapolis.

SEROLOGICALLY NEGATIVE TYPHOID FEVER, CONFIRMED BY CULTURE OF THE BILE. AUGUSTIN CASTELLANOS, J. M. LABOURDETTE and JOSÉ GARCÍA ROMEU, Arch. de med. inf. **5**:376 (Oct.-Dec.) 1936.

The authors report a case in which a child's blood cultures and Widal reaction were negative but culture of his bile was positive. Two weeks later, when the patient was apyretic, the Widal reaction became positive. The authors state that a positive culture of bile for a patient who is acutely ill with fever means typhoid. Cultures will remain positive for some weeks after the temperature has become normal. SANFORD, Chicago.

CONGENITAL MALARIA IN BAHIA. A. BAHIA and J. PEROBA, Pediat. e puericultura **5**:3 (Sept.-Dec.) 1935.

The authors studied sixteen cases. In one the evidence was positive; in the other fifteen it was doubtful or negative. In the one case the mother was attacked in the last months of pregnancy. The organisms were found in the blood of the baby after birth. Treatment with methylquinine was promptly given rectally, and the child recovered. The authors have made an excellent review of the literature on the subject. SANFORD, Chicago.

SCHISTOSOMIASIS IN THE FOOCHOW AREA. R. C. ROBERTSON, Chinese M. J. **50**: 1555 (Nov.) 1936.

There has been an influx of patients with this disease into Foochow in recent years. The diagnosis on admission to the hospital has usually been splenic anemia or Banti's disease, because of the insidious growth of the spleen and because of the blood picture. The patients were usually small and poorly nourished and suffered from general weakness. Further investigation suggested that the enlargement of the spleen might be due to schistosomiasis.

In thirteen cases a complement fixation test was used containing cercarial antigen, probably diagnostic, but the use of it is still in the experimental stage. In biopsy of specimens of the liver secured at operation, small grayish yellow nodules on the surface of the liver were found to be cirrhotic and proved to be ova. In certain cases the spleen showed ova of Schistosomum japonicum.

A close inquiry was made into the habits and homes of the patients. In one village the fact was easily established that mollusks carried cercariae. A large percentage of the stools revealed eggs of Schistosomum. Subsequent investigations showed that hundreds of villagers were infected, some having the disease in an advanced stage, with enormous enlargement of the spleen. Children became infected while wading with bare feet in infected waters. Their early symptoms were intestinal, with bloody mucous diarrhea. The article has eight illustrations and photographs of children and the flukes recovered from them.

NEFF, Kansas City, Mo.

SYSTEMIC INFECTION WITH B. PYOCYANEUS: A REVIEW OF LITERATURE AND A REPORT OF SEVEN CASES. C. E. NIEH, Chinese M. J. **50**:1751 (Dec.) 1936.

The clinical picture of a short typhoid-like disease caused by Bacillus pyocyaneus, reported from Shanghai in 1918, prompted a later search in the records of the Peiping Union Medical College Hospital, where notations were found of seven instances of such systemic infection in the last fifteen years. Nieh reports both primary and secondary cases.

NEFF, Kansas City, Mo.

Chronic Infectious Diseases

THE INFLUENCE OF COPPER ON THE RATE OF DISINTEGRATION OF MAMMALIAN ERYTHROCYTES. G. C. WICKWIRE, W. E. BURGE and RUTH KRAUSE, Am. J. Physiol. **116**:138 (Aug.) 1936.

The rate of disintegration of erythrocytes of nutritionally anemic rats was found to be greater than that of normal animals. With an adequate copper diet the erythrocytes showed an increased resistance to disintegration, indicating that a beneficial effect of copper could be attributed to changes in the corpuscles.

NOURSE, Cleveland.

PROBABLE CASE OF THIRD GENERATION SYPHILIS: REPORT OF A CASE. CHARLES R. REIN and FRANCES SHOSTAC, Arch. Dermat. & Syph. **34**:877 (Nov.) 1936.

The author quotes the following criteria for third generation syphilis from J. H. Stokes:

"(1) Acquired syphilis must be demonstrated in the grandmother and preferably also the grandfather. (2) Prenatal as distinguished from acquired syphilis must be demonstrated in the mother of the third generation case. Acquired syphilis must be excluded in her case and the father must be proved healthy. (3) There must be incontestable evidence of prenatal syphilis in the third generation; and (4) manifestations must appear soon after birth in both the second and third generation."

The case reported meets all the requirements. That third generation syphilis is not common is readily noted from the report of Smith and Howard, who found that 88 mothers with congenital syphilis had 171 children, of whom 8 (4.5 per cent) had third generation syphilis.

DULIN, Iowa City.

THE PRESENT STATUS OF THE TUBERCULIN TEST. H. LOUIS FUERSTMAN, Arch. Pediat. **53**:810 (Dec.) 1936.

The subject of routine tuberculin testing is briefly reviewed. Nothing new is offered as to the current attitude on the subject.

ORR, Buffalo.

PULMONARY ACTINOMYCOSIS. H. Y. HARPER, J. South Carolina M. A. **32**:279 (Dec.) 1936.

The author reports a case of pulmonary actinomycosis. He defines this disease as follows: "Pulmonary actinomycosis is a rare disease, characterized by cough, expectoration, pleuritic pain, loss of weight and strength, hemoptysis, fever and eventual sinus formation in the chest wall."

WESTON JR., Columbia, S. C.

TUBERCULOSIS IN CHILDHOOD. B. SCHICK, M. Clin. North America **20**:719 (Nov.) 1936.

The distinctive features of the childhood type of tuberculosis are the result of the reaction of the virgin tissues of the child to the invasion of the tubercle bacillus. Infection occurs usually by inhalation but occasionally by other routes, such as ingestion. The tuberculous lesion may be recognized microscopically in from two to three weeks, and clinical signs may appear in from four to six weeks. The primary lesion usually heals readily, remaining active longest in the glands. A clinical arrest of the disease, however, requires at least two or three years.

In favorable cases, the disease remains limited to the "primary complex," i. e., the primary focus in an alveolus or small bronchus and the regional lymphatic glands. Further extension, the "secondary stage," may occur by dissemination of the bacilli from the primary complex by way of the lymphatics, the blood vessels or the bronchi. The extent and seriousness of this secondary invasion is determined by three factors: (1) the intensity of the invasion, (2) the resistance of the subject and (3) the organ attacked.

The diagnosis of primary tuberculosis is difficult and often impossible by ordinary clinical means. The x-ray picture does not reveal the fresh primary focus, and calcification indicates a comparatively old lesion. Suggestive clinical signs are loss of appetite, loss of weight and fever. Examination of the contents of the stomach may disclose the organism.

The existence of tuberculous infection is proved by a positive Pirquet or Mantoux test. Schick advises as the safest procedure that a preliminary Pirquet test be made with concentrated tuberculin. If this test is negative, an intracutaneous injection of 0.1 cc. of 1:100 tuberculin is made not longer than from twenty-two to forty-eight hours later. Until the newer purified tuberculin has been more thoroughly tested, he advises that the practitioner continue to use old tuberculin for cutaneous tests.

In spite of the evidence recently brought forward to the contrary, Schick believes that the original idea, that the primary complex has a beneficial effect on later occurring superinfection, must be maintained.

EUGENE SMITH, Ogden, Utah.

PRESENT STATUS AND TECHNIC OF TUBERCULIN TESTING. J. K. DEEGAN, New York State J. Med. **36**:1883 (Dec. 1) 1936.

Intradermal tuberculin tests wth 0.001 mg. of purified protein derivative were given to 3,029 persons attending itinerant clinics for patients with thoracic diseases of the New York State Department of Health; 48.9 per cent gave positive reactions. In 11 patients with positive roentgen evidence of tuberculosis the reactions were negative. Many of the patients referred to the clinic were known to be in contact with tuberculosis. Surveys by means of tuberculin tests should not be attempted unless funds and personnel are available to investigate fully the contacts of the positive reactors. Tuberculosis may be regarded as a disease that is "frequently endemic in certain families rather than a scourge of the entire community." The best results are obtained by extensive studies of these groups. The use of the single dose of 0.001 mg. of purified protein derivative produces too many reactors, and the same may be true of the use of the single dose of 0.00005 mg.

AIKMAN, Rochester, N.Y.

ANÆMIA WITH PIGMENTATION OF THE SKIN: COLLAPSED LEFT LOWER LOBE. G. H. NEWNS, Proc. Roy. Soc. Med. **29**:1209 (Aug.) 1936.

A boy of 7 years had been admitted to the hospital in August 1932 with a history of repeated attacks of abdominal pain of two years' duration, with the intermittent passage of pale loose stools. For six months there had been increasing pigmentation of the skin of the face, trunk and limbs, and the child had lost

considerable weight. The results of physical examination at the time of admission are given in detail. The stools at that time became loose and pale, and on account of this a diagnosis of celiac disease was made. The child was discharged and remained fairly well until March 1936, when he was readmitted to the hospital on account of cough and fever. Physical examination of the chest revealed dulness over the lower lobe of the left lung, with distant tubular breathing and intense whispering pectoriloquy. The results of investigations of the blood made at this time are given in the report. The Mantoux reaction was negative. A roentgenogram of the chest showed collapse of the lower lobe of the left lung.

WILLIAMSON, New Orleans.

SPLENOMEGALY WITH JAUNDICE. A. M. STEWART-WALLACE, Proc. Roy. Soc. Med. **29**:1212 (Aug.) 1936.

A boy was well until eighteen months ago, when he commenced to suffer from attacks of dizziness followed by an urticarial rash. Two months later slight jaundice appeared. On examination the spleen was found to be considerably enlarged. The border of the liver was just palpable below the right costal margin. No ascites was present. Roentgen examination of the chest showed no abnormality, and examination of the heart and lungs gave negative results. The results of investigations of the blood and urine are given in detail.

WILLIAMSON, New Orleans.

APLASTIC ANÆMIA. G. H. NEWNS, Proc. Roy. Soc. Med. **29**:1215 (Aug.) 1936.

A case of aplastic anemia in a boy of 5 years is reported. The results of physical examination and investigations and the progress are given in detail.

WILLIAMSON, New Orleans.

ORIGINS OF TUBERCULOSIS IN INFANCY. J. COMBY, Arch. de méd. d. enf. **39**:761 (Dec.) 1936.

Villemin in 1865 first proclaimed the inoculability of tuberculous material. With Koch's discovery of the tubercle bacillus in 1882, the final blow was given to the dogma of inherited tuberculosis.

Péhu and Chalier proved in 1908 that transmission from mother to fetus was extraordinarily rare; however, preceding them by twenty years, Toledo, a pupil of Grancher, had conclusively demonstrated the apparent impossibility of placental transfer in laboratory animals.

Nocard, the distinguished veterinarian, declared a similar immunity in cattle. To family contagion must be assigned, therefore, practically all tuberculosis in early life, and among these invasions, as shown first by Emmett Holt, the vast majority are concerned with the respiratory system. In an extensive review of the subject, the dean of French pediatricians presents the accepted views on the etiology of this disease in early life, together with a discussion of prophylaxis and treatment. In this connection it is interesting to note that Comby feels that the method of vaccination by B C G is still on trial and that confidence can be won only through a long series of well conducted observations.

AMESSE, Denver.

RECOVERY OF THE TUBERCLE BACILLUS FROM THE GASTRIC CONTENTS. ROBERT DEBRÉ, A. SAENZ, ROBERT BROCA and L. COSTIL, Arch. de méd. d. enf. **39**:779 (Dec.) 1936.

This paper offers the opinion that the simple method of gastric lavage is not utilized frequently enough in the diagnosis of early tuberculosis in childhood. To Henri Meunier must be given credit for the earliest demonstration (1889) of the bacillus in the gastric contents and for the refutation of the prevailing theory that because expectoration is not practiced in infancy it is not feasible to search

for the causative organism. Notwithstanding this observation, the procedure was not employed until interest was revived by Armand-Delille in 1927.

In collaboration with Vibert, this investigator developed the method of homogenization of sputum with soda, which made the identification of the tubercle bacillus relatively simple.

In the event that negative results attend this procedure, inoculation and culture may be utilized.

AMESSE, Denver.

TUBERCULOUS BACILLEMIA IN SUBJECTS SUFFERING FROM ERYTHEMA NODOSUM. ROBERT DEBRÉ, A. SAENZ and ROBERT BROCA, Arch. de méd. d. enf. **39**:787 (Dec.) 1936.

In an attempt to demonstrate the rôle of erythema nodosum as an initial element in tuberculosis in childhood, these observers undertook the study of infections of the blood stream in twenty-nine patients with this disease, from the time of its first appearance. Guinea-pigs were inoculated with blood from these patients during the febrile period, and in five cases the results were positive. It appears from this study that there is, at least in certain subjects, a migration of bacilli from the time of the first appearance of the erythema.

AMESSE, Denver.

PULMONARY STENOSIS IN TUBERCULOSIS. H. GRENET and J. FRANÇOIS-JOLY, Arch. de méd. d. enf. **39**:789 (Dec.) 1936.

The relation between tuberculosis and pulmonary stenosis has been debated for more than a century without definite conclusion. The questions at issue may be resolved into the following: Is there common coexistence of these conditions, and when coexistence is found, does the tuberculosis become of a special type in its anatomicoclinical evolution? In view of the circulatory disturbance caused by arterial stenosis, is one justified in concluding that such embarrassment plays a rôle in the development and progress of tuberculosis?

Two observations are reported by the writers, one of them being pursued for many years. The first concerns a young woman of 26, and the second, a boy of 16. From this study and a careful survey of the literature, it appears that one is not warranted in assuming any important connection between these disorders.

AMESSE, Denver.

ERYTHEMA NODOSUM AND PULMONARY TUBERCULOSIS. C. SARROUY, LE GENISSEL and C. STORA, Arch. de méd. d. enf. **39**:804 (Dec.) 1936.

The early diagnosis of tuberculosis may be achieved through roentgenographic films and tuberculin tests, but the significance of erythema nodosum may not be inconsiderable in the recognition of a primary infection. For the past twelve years the writers have conducted careful studies among the native children of Algiers. Six typical cases are reported, in subjects between the ages of 1 and 11 years, to illustrate the relation between these diseases. The conclusion is reached that, among Algerians at least, erythema nodosum must be considered as an early manifestation of tuberculosis.

AMESSE, Denver.

SOME CLINICAL CONSIDERATIONS IN PULMONARY TUBERCULOSIS IN AN INFANT. ALVIMAR DE CARVALHO, J. de pediat., Rio de Janeiro **3**:506 (Nov.) 1936.

The infant was carefully watched from the time of the appearance of the primary lesion in the lower lobe of the left lung to the time of death. There was at first an acute bronchopneumonic syndrome, which lasted for two weeks and was followed by a local regression of the pulmonary lesion. In the meantime the child contracted measles, which brought the lesion into activity again, and the secondary period was begun. The infant's death followed after a short time. There were no symptoms of generalization.

SANFORD, Chicago.

UNUSUAL TYPES OF PRIMARY FOCUS IN TUBERCULOSIS. E. KNOPF, Monatschr. f. Kinderh. **67**:393 (Dec.) 1936.

Two cases are reported, and numerous roentgenograms are presented. In one the primary focus of tuberculosis remained manifest for three years, with no alteration whatsoever. In the second case observations were continued for eight years after discovery of the primary focus. The disease progressed, in successive steps with intermissions between, into a final phthisis of puberty.

GERSTLEY, Chicago.

X-RAY TREATMENT OF TUBERCULOSIS OF THE HAND: A PRELIMINARY REPORT. C. P. CHANG, C. K. HSIEH and L. J. MILTNER, Chinese M. J. **50**:1621 (Nov.) 1936.

Tuberculosis of the hand has been found in 120 patients in the Peiping Union Medical College Hospital in the last fourteen years. The authors report on six children who had tuberculous lesions of the phalanges, metacarpals and surrounding soft tissues. Improvement usually began during the second or third week of roentgen treatment. The therapy was given only by competent radiologists, and the results were so striking that the benefit cannot be denied.

NEFF, Kansas City, Mo.

TUBERCULOSIS AMONG THE INHABITANTS OF THE GODTHAAB COLONY IN GREENLAND. S. K. SVENDSEN, Ugesk. f. læger **98**:804 (Aug. 27) 1936.

Svendsen has examined the population of the aforementioned Danish colony by means of the Pirquet test and has found the following incidence of tuberculosis: from birth to 1 year, 18.2 per cent; 1 to 2 years, 22.5 per cent; 2 to 3 years, 44.8 per cent; 3 to 4 years, 40.8 per cent; 4 to 5 years, 68.6 per cent; 5 to 6 years, 60.7 per cent; 6 to 10 years, 75 per cent, and 11 to 15 years, 91 per cent.

WALLGREN, Göteborg, Sweden.

Diseases of Blood, Heart and Blood Vessels and Spleen

HEMOPHILIA IN THE NEGRO. NOBLE F. CRANDALL, Am. J. M. Sc. **192**:745 (Dec.) 1936.

It has been considered questionable whether true hemophilia exists in Negroes. The case reported (that of a boy 10 years of age) is apparently the first recorded instance of hemophilia in a full-blooded Negro.

HENSKE, Omaha.

A DOUBLE AORTIC ARCH IN MAN. HOMER BLINCOE, M. I. LOWANCE and JOHN VENABLE, Anat. Rec. **66**:505 (Nov. 25) 1936.

The authors describe a case of symmetrical double aortic arch occurring in a 39 year old Negro.

SNELLING, Toronto, Can.

SICKLE CELL ANEMIA AS A CAUSE OF CEREBRAL VASCULAR DISEASE. R. H. KAMPMEIER, Arch. Neurol. & Psychiat. **36**:1323 (Dec.) 1936.

A 10 year old Negro boy came to a hospital five times in three years with abdominal pain and fever. There were convulsions on three of the occasions and twitching on a fourth. He was found to have sickle cell anemia. This is the fourth case reported in the literature in which similar manifestations occurred. The author suggests that the symptoms in the central nervous system are manifestations of thrombosis in the central nervous system of the same type as that which occurs in the spleen, the lungs, the kidneys, etc., of patients having this disease.

BEVERLY, Chicago.

AN UNUSUAL EXTRACARDIAC MURMUR SIMULATING ORGANIC HEART DISEASE. MARTIN M. MALINER, Arch. Pediat. **53**:496 (July) 1936.

Maliner reports a case of a 12 year old boy in whom the presence of a hemangioma in the abdominal wall in the left epigastrium near the precordium produced an extracardiac murmur, which because of its location caused the condition to be mistaken for organic heart disease.

All investigative studies indicated that the heart was normal.

ORR, Buffalo.

THE CLINICAL AND PATHOLOGICAL FINDINGS IN CONGENITAL MALFORMATIONS OF THE HEART DUE TO DEFECTIVE DEVELOPMENT OF THE RIGHT VENTRICLE ASSOCIATED WITH TRICUSPID ATRESIA OR HYPOPLASIA. HELEN B. TAUSSIG, Bull. Johns Hopkins Hosp. **59**:435 (Dec.) 1936.

The central feature in this congenital malformation is the diminutive size of the right ventricle. The associated malformations can be postulated from the fact that the right ventricle does not function, which means that neither the tricuspid valve nor the pulmonary valve can function and hence that both are either atresic or markedly hypoplastic. Furthermore, it means that the only way for the blood to escape from the right auricle is through some defect in the interauricular septum. The extent of this defect determines whether the heart functions as a biloculate or as a triloculate one.

Clinically, the malformation is associated with persistent cyanosis and no murmurs. The diagnosis is established through the recognition of the diminutive size of the right ventricle. This condition can be recognized in the roentgenogram by the peculiar outline of the cardiac shadow. In the anteroposterior view, because of the absence of the pulmonary conus, the upper contour of the cardiac shadow, immediately to the left of the sternum, has a concave, instead of a convex, outline. In the left anterior oblique position the small size of the right ventricle is indicated by the absence of a cardiac shadow anterior to that of the aorta. These observations are substantiated by the electrocardiogram, which shows a deviation of the axis to the left.

The differentiation between functionally biloculate and triloculate hearts depends on the size of the interauricular septal defect. If there is free communication between the two auricles, i. e., if the heart is functionally biloculate, physical examination yields no additional positive findings. In contrast, when the interauricular septum is well formed, it causes obstruction to the outflow of blood from the right auricle. Under these circumstances the auricular pulsation is transmitted to the liver and is readily palpable at its margin. It is this pulsation at the edge of the liver, occurring in conjunction with a diminutive right ventricle, which distinguishes a functionally triloculate heart from one that is functionally biloculate.

AUTHOR'S SUMMARY.

DISAPPEARANCE OF THE PHYSICAL SIGNS OF RHEUMATIC HEART DISEASE. E. F. BLAND, T. D. JONES and P. D. WHITE, J. A. M. A. **107**:569 (Aug. 22) 1936.

Recent evidence shows that in severe rheumatic infection dilatation of the heart alone may be an important factor in the causation of cardiac murmurs. This is especially true of the mid-diastolic rumbling sound at the cardiac apex, previously thought diagnostic of mitral stenosis. The persistence of murmurs after subsidence of the infection constitutes the most reliable guide to the residual injury in the valve. It is known that these signs of valvular disease last throughout life. It is not well known that these signs may regress and even disappear. Bland, Jones and White studied a thousand children and adolescents with rheumatic fever or chorea who were followed up after their initial illness. In eighty-three of these all clinical evidence of heart disease disappeared. In none was there disappearance of a loud diastolic murmur ending in a loud crescendic presystolic roll or in a

loud aortic diastolic murmur and the peripheral signs of free aortic regurgitation. It is probable that in most of those in whom the murmur disappeared there persists minimal scarring without significant deformity of the valve. Cardiac dilatation alone is occasionally responsible for the physical signs of valvular disease during active rheumatic infection.

BONAR, Salt Lake City.

THE RESULTS OF SPLENECTOMY IN THROMBOCYTOPENIC PURPURA. D. N. BROWN and E. ELLIOTT, J. A. M. A. **107**:1781 (Nov. 28) 1936.

The authors report twenty-one cases of so-called idiopathic thrombocytopenic purpura studied in the past sixteen years. The ten in which splenectomy was done have been followed for more than five years. Eleven cases in which surgical treatment was not given were used as controls. In carefully selected cases in which there has been adequate preparation for operation, splenectomy by an experienced surgeon is an effective treatment with a low operative mortality. The subsequent condition of surgically treated patients as compared with their condition before splenectomy or with that of patients who have not received surgical treatment justifies the operation.

BONAR, Salt Lake City.

MANAGEMENT OF NUTRITIONAL ANEMIA IN INFANCY. C. H. SMITH, M. Clin. North America **20**:933 (Nov.) 1936.

Hypochromic anemia in the pregnant woman may affect unfavorably the prenatal stores of iron in the infant. In this case the administration of iron to the mother during the later months of pregnancy may prove of value. As a basis for diagnosis and treatment of the anemias of infancy, it is necessary to determine as near as possible the optimal hemoglobin values for this age. Smith suggests that with a Sahli (Hellige) type of instrument values of from 10 to 12 mg. of hemoglobin per hundred cubic centimeters be taken as normal for infants from the age of 2 months to the end of infancy; 10 mg. should be regarded as the lower limit, and babies whose blood shows this amount should be watched carefully. When the hemoglobin remains near this low limit and occasionally drops below, iron therapy is indicated. In treatment, the inorganic salts are found to be of the greatest value; the dosage should be based on frequent determinations of the hemoglobin. Copper is seldom found deficient in patients with hypochromic anemia, but added to iron it may be found of value when the anemia becomes refractory to the latter. The details of iron therapy and diet are adequately discussed in this paper.

EUGENE SMITH, Ogden, Utah.

MANAGEMENT OF RHEUMATIC HEART DISEASE. L. P. STRATTON, M. Clin. North America **20**:961 (Nov.) 1936.

The most notable recent advance in the study of rheumatic heart disease is the concept that this disease is but a part of a greater entity known as rheumatic fever. It is unfortunate that this disease, which may have its beginnings in childhood and its full development in later life, cannot be studied throughout the whole of its course by the same group of observers. Much valuable information obtained by early observation is lost, and considerable gaps in care are bound to occur as the patient passes from the pediatrician to the clinic for adults.

Two questions must always be uppermost in the mind when one is managing the ambulatory patient. First and most important: Is the infection active? Second: Does the patient show any evidence of heart failure? The answer to the first question is most difficult. Rheumatic infection of the heart may long continue as a subclinical entity. Even active infection may be present without unequivocal clinical signs. Structural and functional damage of the heart is the result of repeated infections, either subclinical or acute. Hence the necessity of appraising correctly seemingly slight rheumatic symptoms and of exercising meticulous supervision of the child known to be rheumatic.

Treatment of the ambulatory patient consists primarily in conserving the general health and in regulating his activities so that these will be within his capacity, never quite reaching it and never going beyond it. It is especially important to protect the patient from the common respiratory infections. Digitalis is the only drug of value, and one should bear in mind that its field of usefulness is not limited to cases in which fibrillation is shown. Sutton deplores indiscriminate use of salicylates, since they may mask symptoms of activity. They should be given only for short periods of time, when the patient is in bed and under observation. For patients who are in bed with cardiac failure, digitalis, theophylline sodium acetate (theocin) and the mercurial diuretics are the drugs of choice.

The presence of pericarditis implies the presence of pancarditis. Absolute rest in bed and measures for the relief of pain are the therapeutic essentials. If effusion occurs in sufficient amounts to embarrass the circulation and cause a rise in blood pressure, tapping may become necessary. Evacuation of the effusion by the posterior route is a safe and simple procedure. In a few cases of prolonged active carditis, Sutton has been favorably impressed with the results of induced fever therapy. As yet it can be said only that the patients stand this treatment well, even when there is extensive damage to the heart.

EUGENE SMITH, Ogden, Utah.

PROGRESS IN THE RECOGNITION OF CONGENITAL HEART DISEASE. S. MCGINN and P. D. WHITE, New England J. Med. **214**:763 (April 16) 1936.

In 7,500 postmortem examinations performed at the Massachusetts General Hospital in the last forty years, congenital heart disease was found 67 times, an incidence of 0.9 per cent. Of the 67 patients with congenital heart disease, 21 were under 1 year of age. Of the 7,500 autopsies, 3,400 were made in the last fifteen years, and in this group the incidence of congenital heart disease was 1.2 per cent.

The most common congenital defect in the latter group was patency of the ductus arteriosus, which occurred alone in 4 cases and in combination in 5 cases. One of the hearts with a patent ductus arteriosus also had coarctation of the aorta. In 4 hearts there were interventricular septal defects, and in 2 others the condition was complicated by pulmonary stenosis, dextroposition of the aorta and enlargement of the right ventricle, comprising the tetralogy of Fallot.

A correct clinical diagnosis was made 7 times, in 4 adults and 3 infants under 1 year of age. In 5 other persons, including an infant, the condition was suspected and the correct diagnosis entered on the record. In 3 patients congenital heart disease was diagnosed, but the anatomic defect was not noted. One of these had a cor biloculare. In another the condition was diagnosed wrong as to the congenital structural defect in the heart; i. e., it was a case of the tetralogy of Fallot in which there was believed to be a patent ductus arteriosus. In the remaining 25 patients, including 4 infants, congenital heart disease was entirely unsuspected.

An excellent discussion of each congenital cardiac anomaly with its characteristic clinical signs is presented.

GENGENBACH, Denver.

CONGENITAL TRICUSPID ATRESIA. J. W. BROWN, Arch. Dis. Childhood **11**:275 (Dec.) 1936.

An 8 month old boy with tricuspid atresia is presented. There were marked cyanosis at rest and respiratory distress. Death from bronchopneumonia occurred at the age of 8 months. The anatomic diagnosis was: atresia of the tricuspid orifice; interauricular septal defect; interventricular septal defect; hypertrophy and dilatation of the right auricle and left ventricle; rudimentary cavity of the right ventricle.

KELLY, Milwaukee.

EFFECT OF TOXIC SUBSTANCES ON THE BLOOD-FORMING ORGANS. L. J. WITTS, Brit. M. J. **2**:211 (Aug. 1) 1936.

Witts offers a general discussion of the subject as outlined in the caption, with the following summary:

"1. The toxic effects on the blood-forming organs of drugs such as amidopyrine, neoarsphenamine, and gold are usually the result of idiosyncrasy and occur with doses that are well within the ordinary therapeutic limits.

"2. In certain cases the patient becomes sensitized to the drug and an allergic type of response occurs.

"3. Considerable hardship may result from failure to realize the small dosage which may be responsible for damage to the bone-marrow in predisposed individuals, the long incubation period, and the protracted duration of the lesion.

"4. The lesions produced in the marrow are briefly reviewed and classified under the headings of regenerative hyperplasia, dysplasia, neoplasia, and aplasia."

ROYSTER, University, Va.

HORMONAL REGULATION OF THE NUMBER OF BLOOD PLATELETS. H. ZONDEK and KAATZ, Brit. M. J. **2**:387 (Aug. 22) 1936.

This is an account of experiments along the line indicated in the title, with a discussion of the therapeutic indications, the whole of which is summed up briefly in the summary, as follows:

"The blood platelet count in the peripheral blood is increased by the hormone of the thyroid gland. The action is more constant than in the case of red blood cells. The increase usually appears twenty-four to forty-eight hours after the administration of the hormone and has disappeared within about seventy-two hours. The thyrotropic hormone acts in the same way, but its action is more protracted. In a case of chronic thrombopenia in a child a gradually increasing number of platelets was counted after repeated administration of thyrotropic hormone (single dosage, 500 rabbit units). The hormone of the adrenal cortex showed a diminishing effect on the number of blood platelets in a large number of experiments, but in several other experiments this result was not obtained."

ROYSTER, University, Va.

SEPTIC ENDOCARDITIS. HORDER, Lancet **2**:174 (July 25) 1936.

To the clinical picture of septic endocarditis as outlined by Osler and Horder some useful additions have been made by other authors. These include the *"café-au-lait"* complexion, the frequency of clubbing of fingers, the slow development of a special form of nephritis, the immunity of the pericardium and the myocardium throughout the greater part of the duration of the disease and the absence of arrhythmia.

Horder's concept of the disease is that of "focal sepsis" in an inaccessible but vitally significant situation—inaccessible, in the first place, from the point of view of treatment by drainage and, second, in a relative sense, to therapeutic measures of the immunologic and/or of the chemical sort.

Subendothelial colonization of micro-organisms, which is the essential lesion of the disease and which removes it definitely from the category of true septicemia, is not lightly influenced in an effective manner by a blood stream which is charged either with bactericidal principles or with chemical antiseptics.

Horder favors the trial of roentgen rays or radium in this disease, citing a case of recovery (of eighteen months' duration at the time of writing) after the use of radium.

The preventive measures that he considers important include: (1) any measures that will lower the incidence of rheumatism and scarlet fever, (2) rigid attention to hygiene of the mouth, nose and throat in cases of established valvular disease, (3) avoidance of strain, physical and emotional, especially prolonged, and (4) extra caution during convalescence from acute infections for subjects with valvular lesions.

LANGMANN, New York.

A New Method of Treatment in Haemophilia. W. A. Timperley, A. E. Naish and G. A. Clark, Lancet **2**:1142 (Nov. 14) 1936.

One of the authors (W. A. T.) found that on incubating egg white at 37 C. for several days in the presence of potassium bromide it is possible to extract from the mixture a substance which, when added to blood in vitro, under certain conditions leads to the formation of a clear, structureless gel which does not shrink like the ordinary blood clot.

On intravenous or intramuscular injection this substance reduces the clotting time of blood and controls hemorrhage in hemophiliacs. Even when injected in large quantities, it has never been found to produce either local or general intravascular clotting. Repeated injections are necessary to control the tendency to hemorrhage in hemophilia.

A derivative of mucic acid has been found to have properties similar to those of the reported substance.

Langmann, New York.

Some Disturbances of the Circulatory System Due to Pneumonia and Other Toxic Conditions. E. F. Gartrell, M. J. Australia **2**:76 (July 18) 1936.

The toxic effect on the circulatory system of such diseases as pneumonia, influenza, typhoid and typhus fever and hyperthyroidism may show itself as myocardial failure, peripheral failure or both. Frank myocarditis, however, is comparatively uncommon except in typhus fever, and signs of heart failure are usually not prominent except in the presence of preexistent cardiovascular disease. Damage to the small peripheral vessels is probably the more important lesion and may be the cause of death, especially in diphtheria. The two main signs of peripheral failure are falling blood pressure and cyanosis. Treatment includes that with hydrotherapy, epinephrine and solution of posterior pituitary. The latter must not be used in the presence of a diseased myocardium, because, in addition to its action in constricting peripheral vessels, it tends to dilate the heart and to constrict the coronary vessels. Alcohol is contraindicated because of its dilating effect on peripheral vessels. In severe cases no drug will prevent the fatal issue. During convalescence from peripheral failure the sense of weakness, faintness, giddiness, breathlessness and palpitation on slight exertion should be treated by physical therapeutic measures and the patient assured that he is on the road to complete recovery.

Gonce, Madison, Wis.

Erythroblastosis with Osteoporosis (Cooley's Syndrome). A. Leone and E. Lugas, Clin. pediat. **18**:463 (Aug.) 1936.

Leone and Lugas report four carefully studied cases of so-called Cooley's anemia from the pediatric clinic of the Royal University of Cagliari, Sardinia. There would be scant reason for noting these cases if it were not for the fact that they occurred in Italy. Ever since this syndrome was first recognized as an entity, the question has been raised frequently as to whether it occurs in Italy. In the cases previously reported in the Italian literature the patients did not show the typical facies and bone changes (Josephs: *Medicine* **15**:307, 1936). There can be no doubt that the photographs of patients and x-ray pictures reproduced in this article show pathognomonic changes.

Dooley, New York.

Myelogenous Erythroleukemia Infantum. A. Simonini, Clin. pediat. **18**:521 (Aug.) 1936.

Simonini briefly describes the case of a 5 month old baby who, after the subsidence of a febrile infection at the age of 3 months, gradually began to have a lemon yellow pallor and enlargement of the spleen and liver. She also failed to

gain weight. Examination of the blood showed: erythroblasts, 1 per cubic millimeter; myeloblasts, 0; premyelocytic neutrophils, 0; myelocytic neutrophils, 13; myelocytic basophils, 1; metamyelocytic neutrophils, 5; polymorphonuclear neutrophils, 40; polymorphonuclear eosinophils, 2; polymorphonuclear basophils, 1; monocytes, 0; lymphocytes, 36; total leukocytes, 65,000; total erythrocytes, 2,100,000; hemoglobin, 26 per cent; nucleated erythrocytes, 136 per thousand, extreme anisocytosis and poikilocytosis.

The author speculates at length concerning the etiology of this condition without being able to reach any satisfying conclusions.

DOOLEY, New York.

THE RELATIONSHIP BETWEEN TAY-SACHS' AND NIEMANN-PICK'S DISEASE, WITH SPECIAL REFERENCE TO THE BIOCHEMICAL MECHANISM OF THE PROCESSES. K. VON SÁNTHA, Arch. f. Psychiat. **101**:593, 1933.

Von Sántha insists on the difference between amaurotic family idiocy and lipoid histiocytosis both on a morphologic and on a biochemical basis. According to Spielmeyer and Bielschowsky, there is accumulation of prelipoid and lipoid substances in the cell plasma, which secondarily, through imbibition of water, causes swelling of the cell. However, Schaffer expressed the belief that the prelipoid materials are deposited in the primarily swollen plasma. Schaffer also claimed that Tay-Sachs' and Neimann-Pick's disease are phenotypically different disorders. In Tay-Sachs' disease there is elective involvement of the neural parenchyma, spreading from the cerebral cortex to the sympathetic ganglion cells, whereas in lipoid histiocytosis there is involvement not only of the neural elements but of the connective tissue, especially of the histiocytes throughout the body. In amaurotic idiocy there may be involvement of the glial elements. The two diseases are similar in that histochemically lecithin is present in the cells. The greatest difference between the two diseases has been shown by Epstein. In the brain affected with Niemann-Pick's disease there is a surplus of 80 per cent of ether-soluble phosphatides of the lecithin group, while in amaurotic idiocy there is no increase in the phosphatides. The material from patients with the latter condition, however, had been subjected to formaldehyde fixation for a number of years; it has been shown that formaldehyde reduces the phosphatide content. It seems that breaking down of the molecule of phosphatide gives rise to numerous smaller molecules with greater endosmotic tension, causing imbibition of water. Finally, from each consideration it appears that Niemann-Pick's disorder is an example of simple infiltrative lipoidosis, while Tay-Sachs' disease, as indicated by the chemical findings, is fatty degeneration rather than lipoidosis.

FREEMAN, Washington, D. C. [ARCH. NEUROL. & PSYCHIAT.]

A CASE OF HEALED AGRANULOCYTOSIS IN INFANCY. SIEGFRIED WOLFF, Jahrb. f. Kinderh. **144**:357, 1935.

Of thirty-five cases of granulocytosis, in only six was cure reported. To these six Wolff adds his case, that of a 1 year old girl whose symptoms appeared after intestinal catarrh of short duration. The findings included spastic paralysis of the whole left side, including the soft palate and the muscles of respiration, and severe gingivitis and stomatitis. The blood picture showed neutropenia. The condition became worse from day to day, and on the seventeenth day of the illness she was moribund. After 150 cc. of blood was given intravenously, the general condition, the blood picture and the paralysis rapidly improved, and at the last report she was still in good health.

The pathogenesis of this condition is still unknown. Willi is quoted as stating that a poison leads simultaneously to insufficiency of bone marrow and to paralysis of the remaining protective mechanism in the affected persons and that to these chemical or bacterial poisons there is a preceding hypersensitivity.

LANDAU, Hannibal, Mo.

BOWING OF THE PULMONARY ARTERY IN CHILDREN WITH NORMAL HEARTS. HERBERT SCHOENFELD and HILDE FRANK, Monatschr. f. Kinderh. **67**:411 (Dec.) 1936.

The writers submit roentgenograms showing bowing of the pulmonary artery in children who obviously had no cardiac lesions. On the basis of results of tuberculin tests and of general examinations, they conclude that these abnormal findings are in no way related to the heart but are the results of pleural change.

GERSTLEY, Chicago.

AN UNEXPECTED CAUSE OF DEATH IN A HEMOPHILIC INFANT. BOTROS SALIB, J. Egyptian M. A. **19**:763 (Dec.) 1936.

The author reports the death, from exsanguination, of a 2½ month old Egyptian boy five days after a village barber had made a superficial scratch on the upper part of his left arm, in order to vaccinate him against smallpox. The patient was an only child, but his maternal uncle suffered from severe epistaxis on the least provocation.

MULHERIN, Augusta, Ga.

MORPHOLOGIC BLOOD PICTURES OF PREMATURE AND OF FULL TERM INFANTS DURING THE FIRST MONTHS OF LIFE. S. VAN CREVELD, Maandschr. v. kindergeneesk. **6**:98 (Dec.) 1936.

The results of a comparative examination of the morphologic blood pictures of premature and of full term infants during the first months of life are reported. Notwithstanding the fact that in full term infants there is a higher leukocyte count during the first days of life than appears in premature infants, the percentage of lymphocytes in full term children during that period has a tendency to be lower than that in premature infants. In premature infants the "stable" condition, with a high percentage of lymphocytes, is usually reached some weeks later than in full term infants.

The changes in the number of leukocytes and in the morphologic picture of the blood were studied in a number of premature infants at different hours of the day. In this examination sometimes important oscillations in the number of leukocytes were found during the day. This, however, had only a negligible effect on the differential count.

VAN CREVELD, Amsterdam, Netherlands.

Diseases of Nose, Throat and Ear

FIFTEEN YEARS' EXPERIENCE WITH DRAINAGE TUBES AFTER ANTROSTOMY IN CHILDREN. JOHN J. SHEA, Arch. Otolaryng. **24**:14 (July) 1936.

After observation of drainage tubes after antrostomy in children for fifteen years Shea states that the results can be favorably compared with those obtained in adults. A well placed drainage tube proves most effective in removing the focus of infection, though medical therapy is usually considered. He discusses the operative procedure and advises the removal of the tonsils and adenoid tissue. In view of the fact that the postoperative treatment is painless, it can be thorough. Autogenous vaccine given during the fall, winter and following spring, constant observation being carried out, will reestablish the normal functions of the sinus.

GREENWOOD, Chicago.

DISLOCATION OF THE LOWER END OF THE NASAL SEPTAL CARTILAGE: A TREATISE DEALING WITH DISLOCATIONS OF THE LOWER END OF THE NASAL SEPTAL CARTILAGE IN THE NEW-BORN (INJURY SUSTAINED AT BIRTH), IN INFANTS AND IN YOUNG CHILDREN AND WITH THEIR ANATOMIC REPLACEMENT BY ORTHOPEDIC PROCEDURES. MYRON METZENBAUM, Arch. Otolaryng. **24**:78 (July) 1936.

Metzenbaum explains that in the human being the lower half of the nose consists of cartilages and soft tissues and contains no bony supporting structures. He

mentions the striking difference between the cartilaginous fleshy lower part of the nose of human beings and the bony formation of the lower half of the nose in most vertebrates. This can be accounted for by fetal development and birth, and this flexible structure is nature's way of protecting the infant and young child from incurring concussion of the brain and fracture of the cribriform plate of the ethmoid sinus or the outer plate of the frontal sinus bone. He discusses the results of trauma to the nasal tip and explains that correct breathing in an infant is responsible for correct development of the arches of the mouth. Dislocation of the septal cartilage results in interference with normal breathing and ventilation of the nasal accessory sinuses. He describes orthopedic methods for replacing dislocated cartilage in infants and children: (1) manual, (2) instrumental, (3) closed and (4) open or combined open and closed. His observations reveal that by correcting this dislocated cartilage in the lower end of the nose, normal breathing, ventilation, appearance and development as well as function are effected.

GREENWOOD, Chicago.

ROENTGEN RADIATION TREATMENT OF CHRONIC COUGH OCCURRING DURING CHILDHOOD. C. LIEBMAN, Canad. M. A. J. **35**:643 (Dec.) 1936.

Seven hundred children with persistent cough were treated with roentgen radiation. This treatment was found to be of distinct value when the cough was an aftermath of either pertussis or an acute infection of the upper respiratory tract.

The amount of radiation used was small. The technic followed closely that used by others in the treatment of pertussis: 111 kilovolts; 4 milliamperes; 50 cm. skin test dose; 4 mm. aluminum filter. The treatments were given to the back and front of the chest, alternately, the total being four treatments, two behind and two in front.

No injurious effects were noted.

No child with a chronic or persistent cough should be treated by roentgen radiation before all etiologic factors have been satisfactorily eliminated.

MOORE, Omaha.

DERMOID TEETH IN THE EXTERNAL AUDITORY CANAL, WITH COMMENTS ON TERATOMAS AND DERMOIDS IN GENERAL. G. G. MARSHALL, New England J. Med. **214**:202 (Jan. 30) 1936.

Because of increasing deafness a boy aged 15 years was operated on for an apparent large exostosis in the right auditory canal, which proved to be a molar tooth. On removal of this tooth, another imperfect molar was found deeper in the auditory canal. Roentgenograms of the jaw showed the right lower third molar missing and the left lower third molar horizontal and unerupted.

GENGENBACH, Denver.

CULTIVATION OF THE VIRUS OF THE COMMON COLD IN THE CHORIO-ALLANTOIC MEMBRANE OF THE CHICK EMBRYO. YALE KNEELAND JR., K. C. MILLS and A. R. DOCHEZ, Proc. Soc. Exper. Biol. & Med. **35**:213 (Nov.) 1936.

Nasal washings from a person with an acute cold in the head were implanted on the chorio-allantoic membrane of a developing chick embryo, according to the technic described by Woodruff and Goodpasture, and passed through three series of eggs. This material was used for intranasal inoculation of two volunteers, and in each instance a typical cold was produced.

HANSEN, Minneapolis.

ACCESSORY NASAL SINUSITIS IN CHILDHOOD, WITH A RECORD OF BACTERIOLOGICAL EXAMINATIONS. J. CROOKS and A. G. SIGNY, Arch. Dis. Childhood **11**:281 (Dec.) 1936.

This is an exhaustive study of a hundred cases of sinusitis in children ranging in age from 2½ to 12 years. The diagnosis was made on clinical manifesta-

tions, inspection of the nose and throat, roentgen study, transillumination, and puncture and aspiration. The maxillary antrum is more frequently the seat of disease than the other sinuses. Ethmoiditis is probably second to antral infection in frequency.

Cooks and Sidny believe that sinusitis is a common cause of inflammation of the adenoids and to a lesser degree of inflammation of the tonsils. The first step in the treatment of sinusitis is the treatment of the sinus itself, and not the removal of tonsils and adenoids. If the latter are infected and fail to respond to such treatment, they should be removed. If there is a large pad of infected adenoids interfering with respiration, treatment of coexisting sinusitis is not likely to lead to a cure until the pad is removed.

KELLY, Milwaukee.

THE "RUNNING" NOSE: CLINICAL RECOLLECTIONS AND REFLECTIONS. G. EWART MARTIN, Edinburgh M. J. **43**:498 (Aug.) 1936.

Martin is a surgeon in the department for diseases of the ear, nose and throat of the Royal Infirmary, Edinburgh. He states that as otitis media comes by way of the nasopharynx and nose, there would be much less infection of the ear and, generally, much less deafness if more attention were paid to the nose, which as a focus of infection is equally as important as the pharynx or the tonsils. A child with a running nose goes everywhere; children with sore throat are kept at home.

The author discusses the anatomy and physiology of the nose and the moistening of the inspired air by the normal constant secretion which in an adult amounts to 17 ounces (503 cc.) per day, depending on the dryness or the moistness of the atmosphere. Normally one side of the nose is more active than the other. Whenever there is blocking of one side from disease or some other abnormality, the secretion which is formed on that side is not picked up by normal air, and it falls down to the floor of the nose, coagulates, drops backward or slips forward and gives the first indication of a running nose.

In persons with adenoids both airways become blocked, and this produces mouth breathing during the day or night. The chest cannot be sufficiently expanded because of the lack of moisture.

Martin discusses the disturbed filtration of inspired air, caused by the failure of the nose to continue as a filter for germs when the mucous membrane is disturbed. Foreign matter in the nose arrests the filtering action of the cilia.

How effective is the use of drugs in the nose? Those drugs which clog up the mucous covering interfere with the activity of the cilia. In a normal healthy person the majority of pathogenic organisms entering the nose are destroyed. The nasal secretion must be preserved. The only douche should be one of an isotonic solution, the only oil used a volatile one. The author objects to continuous treatment, especially with one type of medicine, because of interference with ciliary action. In early inflammatory conditions the prevention of blocking may be possible by the temporary and scanty use of drugs which shrink the nasal mucosa.

The author then discusses the treatment of common colds and the question of the removal of adenoids and tonsils.

NEFF, Kansas City, Mo.

ETIOLOGY OF CONGENITAL DEFORMITIES OF THE NASAL SEPTUM. H. RICHTER, Hals-, Nasen- u. Ohrenarzt (Teil 1) **27**:53 (March) 1936.

Richter advances evidence to the effect that congenital bending of the nasal septum is frequently a result of the primary enlargement of one or several of the nasal conchae. He points out that such hyperplasia of the nasal conchae occurs during the embryonal period, he himself having made observations on human embryos which indicate this. He thinks that such hyperplasia of the nasal conchae may be of inflammatory or other origin.

EDITOR'S ABSTRACT. [ARCH. OTOLARYNG.]

CLINICAL SYMPTOMS OF CHRONIC TONSILLITIS. Z. WEIN, Monatschr. f. Ohrenh. **70**:310 (March) 1936.

Wein discusses the characteristics that determine the diagnosis of chronic tonsillitis and are important in deciding as to the advisability of tonsillectomy. First, he gives his attention to the perfusion with blood and the thickness of the mucous membrane covering the tonsils. If the tonsils are inflamed, the mucous membrane covering them likewise exhibits inflammatory changes (thickening and swelling). However, care is necessary, for the inflammation of the tonsillar mucous membrane not only may be caused by an inflammatory process in the tonsils but also may be a sequel of pharyngeal catarrh. He emphasizes that not all cervical pains, difficulties in swallowing or sensations of the presence of a foreign body are caused by the tonsils.

Further, Wein gives his attention to the hypertrophy of the tonsils, pointing out that swelling and enlargement are usually signs of chronic inflammation; in rare cases, however, a hidden chronic abscess may be the cause of circumscribed protrusion of the tonsils.

The investigation of the firmness of the tonsils is likewise important. In diseased tonsils hardening of the whole or of parts is perceptible. Sensitivity to pressure deserves attention, particularly when there is a difference between the two sides. In discussing the importance of the test for expression Wein points out that expression of detritus from the supratonsillar fossa does not necessarily indicate chronic tonsillitis, but if detritus and particularly pus can be expressed from the numerous lacunae, the presence of inflammation may be assumed. The appearance of fluid pus on slight pressure is the surest sign of chronic tonsillitis, but if infiltrated pus shines through the superficial follicles, this likewise is a sign of chronic tonsillitis. Fixation of the tonsils by peritonsillar cicatrization and adhesions is another sign of chronic tonsillitis, and the author thinks that this sign is not given sufficient attention.

Further, he discusses the inflammation of the regional lymph glands. He admits that cervical lymphadenitis may be caused by other factors than chronic tonsillitis; however, in many cases it is indicative of chronic tonsillitis, particularly if the inflammatory symptoms of the tonsil and of the lymphatic apparatus are homolateral. He advises that in the examination of the tonsils the palpation of the cervical lymph glands should not be neglected.

In the last part of his paper he stresses the importance of the anamnesis, pointing out that in order to determine the advisability of tonsillectomy, the symptom of chronic tonsillitis should be evaluated in the light of the anamnesis.

EDITOR'S ABSTRACT. [ARCH. OTOLARYNG.]

PREVENTION OF TONSILLOGENIC SEPSIS BY ABSCESS TONSILLECTOMY. A. LINCK, Ztschr. f. Hals-, Nasen- u. Ohrenh. **39**:329, 1936.

Linck says that in a former report he designated peritonsillar abscesses as the precursors and forerunners of tonsillogenic sepsis. He admits that this point of view contradicts that held by most other authors, who consider the peritonsillar abscesses as entirely benign complications of acute inflammation of the throat and therefore restrict themselves to a minimum of therapeutic measures, an expectant attitude and incision. The author thinks that such a stand cannot be defended in view of the serious rôle played by peritonsillar abscesses in the development of tonsillogenic sepsis. He demands abscess tonsillectomy for all patients with manifest or regressing peritonsillar abscesses and for all in whom peritonsillar inflammation or phlegmon seems probable. To be sure, he admits that peritonsillar abscesses have been known to develop after tonsillectomy (not abscess tonsillectomy). However, it has been proved that such abscesses were usually caused by remaining inflamed tonsillar remnants. Moreover, he is convinced that in abscess tonsillectomy, when the tonsillar base is softened and loose, the persistence of remnants is much less likely than in tonsillectomy that is done during the interval, when the capsule is tightly connected, perhaps even by adhesions.

It is further pointed out that the peritonsillar abscesses are not always single or repeated disease processes, which, after having taken their course, subside completely, but are often phases of a continuous process. On the basis of case reports, he discusses the various phases and shows that the first phase, that of localization, is the best for the prophylactic treatment of tonsillogenic sepsis by means of abscess tonsillectomy.

EDITOR'S ABSTRACT. [ARCH. OTOLARYNG.]

Diseases of Lungs, Pleura and Mediastinum

LIPOID PNEUMONIA AND CONDITIONS THAT MAY FAVOR ITS OCCURRENCE. LEONA BAUMGARTNER and D. MURRAY ANGEVINE, Am. J. M. Sc. **192**:252 (Aug.) 1936.

Three cases of lipoid pneumonia in infants under 2 years of age are described. Two occurred in children with extensive lesions of the central nervous system and one in a debilitated child who was restrained in a plaster cast because of congenital dislocation of the hip. Clinical diagnoses were made in two instances on the basis of the history, the physical findings and the characteristic roentgenologic picture. In two cases the cause was apparently the administration of mineral oil together with viosterol. In the other case the condition was due to cod liver oil alone.

HENSKE, Omaha.

ACUTE EMPYEMA IN INFANCY AND CHILDHOOD. C. M. BURPEE, Arch. Pediat. **53**:449 (July) 1936.

Burpee reports a statistical study on eighty-five cases of acute empyema, with a comparison of the disease in white and Negro children.

Sixty-seven per cent of the patients were white, and 33 per cent were Negroes. Pneumonia was the cause of the empyema in 80 per cent, influenza in 7 per cent, tuberculosis in 4.7 per cent, septicemia in 1.1 per cent and typhoid in 1.1 per cent. Tuberculosis was the antecedent lesion in 14.3 per cent of the Negro patients and in none of the white children. The empyema was of the metapneumonic type in 72.2 per cent and synpneumonic in 9.3 per cent. The pneumococcus was the causative organism in 40 per cent, the streptococcus in 4.7 per cent, the tubercle bacillus in 4.7 per cent and the staphylococcus in 2.3 per cent, and the type of organism was unknown in 47 per cent. In 11.8 per cent of the cases the empyema occurred in infancy, in 40 per cent between 2 and 6 years of age and in 48.2 per cent between 6 and 12 years of age. Sixty-four and seven-tenths per cent of the patients were boys and 35.3 per cent girls. In 84.6 per cent of the cases the attack occurred in the winter and spring months. The various symptoms and signs presented by the patients in the order of their frequency were: (1) pain, (2) dulness, (3) limitation of motion, (4) displacement of thoracic viscera, (5) cough, (6) expectoration and (7) absence of breath sounds. The empyema was on the right side in 38.8 per cent of the cases, on the left side in 58.8 per cent and bilateral in 1.4 per cent, and in 1.4 per cent the location was not stated. The fluid was purulent in 69.4 per cent of the cases, hemorrhagic in 7 per cent and serous in 4.7 per cent, and in 18.8 per cent it was not described. Aspiration alone or with replacement of air was used in 23.5 per cent of the cases, intercostal drainage in 24.5 per cent, rib resection in 43.5 per cent and symptomatic treatment in 9.4 per cent. Aspiration was followed by cure in 70 per cent of the cases, improvement in 20 per cent and death in 10 per cent. Intercostal drainage was followed by cure or improvement in 85.5 per cent and death in 14.3 per cent. Rib resection was followed by cure or improvement in 83.8 per cent and death in 16.2 per cent. Open drainage was used in 64.7 per cent of the cases, with a mortality of 16.3 per cent, and closed drainage was used in 27 per cent, with a mortality of 8.6 per cent. Complications occurred in 17.6 per cent of the cases and were twice as frequent in the Negro as in the white race. The mortality for the entire group was 20 per cent—10.5 per cent for the white persons and 39.2 per cent among the Negroes.

It was the highest in infancy, when it was 50 per cent, 80 per cent of the deaths in this period occurring in the Negro race. The average stay in the hospital for patients treated by rib resection and intercostal drainage was fifteen days in each group, and for those treated by aspiration, thirty-five days. ORR, Buffalo.

CONGENITAL ATELECTASIS DUE TO FETAL PNEUMONIA. JAMES S. RAUDENBUSH, Arch. Pediat. **53**:803 (Dec.) 1936.

The author reports what appeared to be a case of congenital atelectasis occurring in a boy. ORR, Buffalo.

ROENTGEN TREATMENT OF SEVERE ASTHMA. CHARLES K. MAYTUM and EUGENE T. LEDDY, J. Allergy **8**:66 (Nov.) 1936.

Twenty-three patients, averaging 46 years of age and suffering from severe asthma, were treated with roentgen radiation. Other forms of treatment had given no relief. In 5 cases marked relief ensued, lasting several months; in 8 cases there was from 50 to 75 per cent relief, and in the remaining 10 cases there was no relief. The treatment was given over the mediastinum, the paravertebral area, the spleen or a combination of these, depending on the case.

HOYER, Cincinnati.

TIME CHANGES IN THE MORTALITY FROM ACCIDENTAL MECHANICAL SUFFOCATION AMONG INFANTS UNDER ONE YEAR OLD IN DIFFERENT GEOGRAPHIC REGIONS OF THE UNITED STATES, 1925-1932. WILLIAM M. GAFAFER, Pub. Health Rep. **51**:1641 (Nov. 27) 1936.

This study is of deaths due to mechanical suffocation in children under 1 year of age from 1925 to 1932. The mortality per hundred thousand live births was, for the southeastern states, Negro, 76.1, and white, 38.3; for the north central states, 39.8; for the western states, 33.3, and for the northeastern states, 25.5.

The rates of mortality from accidental mechanical suffocation in the northeastern, north central and western regions, while unlike in the different regions, were practically constant during the eight years. In the southeastern region the rate declined.

SANFORD, Chicago.

FACTORS PREDISPOSING TO RESPIRATORY DISEASE IN THE PRE-SCHOOL CHILD. A. D. BELL, Brit. M. J. **2**:420 (Aug. 29) 1936.

This is a general discussion of the subject outlined in the title, from practically all angles. ROYSTER, University, Va.

FATAL HAEMOPTYSIS IN A CHILD OF FIVE. F. A. BELAM, Brit. M. J. **2**:920 (Nov. 7) 1936.

The case reported is that of a girl 5 years of age who had had whooping cough followed by pneumonia in July 1934. Tonsillectomy had been performed in September 1935. In April 1936 measles developed, and this was followed in July by scarlet fever. The patient had had a cough during most of each winter after the pneumonia. In May 1936 she was admitted to the Middlesex Hospital. There were scattering râles of various sizes at the base of the left lung. Roentgen examination showed no indication of diseased glands. The reaction to tuberculin was strongly positive. A peritonsillar abscess then developed. On July 28 she had hemoptysis of 2 ounces (60 cc.) at 8 p. m. and of ½ ounce (14.8 cc.) at 10 p. m. On July 29 at 1:15 p. m. there was hemoptysis of about a pint (475 cc.). At 6 p. m. on July 30 there was another sudden hemoptysis of probably more than a pint, and ten minutes later the child died. Autopsy showed evidences of old tuberculosis. ROYSTER, University, Va.

SPONTANEOUS SURGICAL EMPHYSEMA IN CHILDREN. A. G. WATKINS, Brit. M. J. **2**:965 (Nov. 14) 1936.

The author outlines the causes and instance of emphysema. He reports three cases and offers the following summary:

"(a) Spontaneous surgical emphysema is a rare condition in children.

"(b) Three cases are reported, together with a further case illustrating the mechanism by which the condition arises.

"(c) It is postulated that emphysematous bullae track up the mediastinum, mainly along the lymphatic planes, to the subcutaneous tissues of the neck.

"(d) No special treatment is urged, but artificial pneumothorax may be performed.

"(e) The prognosis of any case is not made worse by the complication of emphysema."

ROYSTER, University, Va.

LOBECTOMY IN BRONCHIECTASIS. W. C. ROMANIS and T. H. SELLORS, Lancet **2**:1445 (Dec. 19) 1936.

The authors believe that bronchiectasis, however slight, is always slowly progressive, but since many years may elapse before the almost inevitable disabling features of the disease develop, they feel that patients with this condition can be treated medically and conservatively and observed until the definite downward progress and the suggestion of toxic symptoms call for the consideration of surgical intervention. They favor the single stage operation.

The series of cases reported includes those of nineteen children who were subjected to single stage lobectomy. Eleven patients became free from symptoms; four improved, and four died.

Collapse therapy, pneumonectomy by cautery and simple pneumonotomy are regarded as palliative and usually long-drawn-out forms of therapy.

LANGMANN, New York.

COLLAPSE OF THE LEFT LOWER LOBE. W. G. WYLLIE, Proc. Roy. Soc. Med. **29**: 1215 (Aug.) 1936.

A boy of 6 years was admitted to the hospital on account of a persistent cough which had been present since an attack of measles in December 1935. He had no history of pneumonia. A roentgenogram of the chest showed on the left side a triangular shadow, indicative of collapse of the lower lobe of the left lung. Roentgen examination after the injection of iodized poppy-seed oil 40 per cent showed no bronchiectasis. Bronchoscopy was performed, and the result of this is given.

WILLIAMSON, New Orleans.

PNEUMATOCELE OF NECK. DONALD BATEMAN, Proc. Roy. Soc. Med. **29**:1217 (Aug.) 1936.

A case of pneumatocele of the neck in a boy of 5 years is reported. The patient was one of twins. The other twin was normal.

WILLIAMSON, New Orleans.

ACUTE PULMONARY EDEMA IN A NEW-BORN CHILD: THE REFLEXES AS THE CAUSE OF ACUTE PULMONARY EDEMA. M. SCHÄCHTER, Lattante **7**:286 (June) 1936.

A seemingly healthy boy, weighing 3.5 Kg., began at the age of 48 hours to refuse the breast, then to vomit and finally to raise considerable material from the lungs. Twenty-four hours later he died, and a diagnosis of acute pulmonary edema was made.

Recent Italian experimental work seems to indicate that acute pulmonary edema is not wholly a mechanical or hemodynamic problem; it may be due to physiologic abnormalities of the sympathetic nervous system. Large doses of epinephrine have been reported to produce pulmonary edema in vagotonic persons. Also, pressure on the carotid sinus has been known to start a vasospasm and pulmonary edema.

HIGGINS, Boston.

A CLINICAL CASE OF BRONCHOTETANY. E. DIAZ ORERO, B. SÁNCHEZ SANTIAGO and E. GALÁN, Arch. de med. inf. **5**:343 (Dec.) 1936.

A 9 month old child showed symptoms of spasmophilia, hypocalcemia and alkalosis. She had many attacks of bronchotetany. Magnesium sulfate had no effect on the tetanic symptoms or the laryngospasm, but calcium chloride controlled them. Death occurred from serous meningitis.

SANFORD, Chicago.

PRIMARY CANCER OF THE LUNG IN AN ELEVEN YEAR OLD CHILD. GUSTAVO CARDELLE, F. SALA PANISELLO, RAÚL PEREIRAS and CARBONEL SALAZAR, Arch. de med. inf. **5**:351 (Oct.-Dec.) 1936.

The tumor in the case reported was a carcinoma with oat-shaped cells. The case is the first of its kind among 10,000 reports which are on file in the Municipal Hospital for Children in Havana.

The photographs of the sections are excellent. Histologically it is shown that the origin of malignant epithelial tumors in the lung is in the basal layers of the mucosa of the bronchial tree.

SANFORD, Chicago.

CHRONIC PNEUMONIA IN INFANCY. A. BAHIA, Arch. de pediat., Rio de Janeiro **9**:49 (Dec.) 1936.

It is physically and roentgenographically impossible to distinguish between a chronic pneumonia and a tuberculous process. Bahia feels that frequently the mistake is made of considering the pneumonic process tuberculous. This should never be done unless there is a positive reaction to tuberculin. The prognosis of chronic pneumonia (either lobar or bronchial) is almost always favorable.

SANFORD, Chicago.

HEMOTHERAPY IN ACUTE RESPIRATORY INFECTIONS OF THE CHILD. D. BERRIO, Fisio-pat. inf. **11**:71, 1934.

"We have in hemotherapy a method of positive action which produces no reaction and which besides is very easy to employ." The twenty cases reported include cases of lobar pneumonia and of bronchopneumonia. In all, the injection of blood caused marked lowering of the temperature and improvement in the aucultatory signs and in the pneumonia, curing the patient in a few days. In a series of forty-five patients treated by Professor Sumer there were three deaths, a mortality of 6.6 per cent. In several cases in which such agents as vaccines, serums and silver salts had failed, hemotherapy was successfully employed. From 20 to 50 cc. of whole blood from the parents is given intramuscularly every one or two days until the temperature is normal. Berrio states that the injection of blood produces a Widal reaction or a hemoclastic crisis which promotes a favorable modification in the colloidal equilibrium of the body, causing a stimulus or an increase in the reactive power opposed to microbes and their toxins. Again, immunity results from the antibodies contained in the blood injected. Besides, the fall in temperature (an effect opposite to that produced by vaccines) places the body in better conditions of defense, since with a lower temperature the cell works and defends itself better (this is what is being attempted in the use of aminopyrine in typhoid fever).

GIFFEN, Toledo, Ohio.

THE SIGNIFICANCE OF CONGENITAL ANLAGE AND ACQUIRED PNEUMONIA FOR THE DEVELOPMENT OF BRONCHIECTASIS IN CHILDHOOD. G. EDEL, Arch. f. Kinderh. **108**:204 (Aug. 4) 1936.

Thirty-four cases of bronchiectasis in children were analyzed. In approximately one-third of the cases the condition was on a congenital basis, and in two-thirds it was the result of pneumonia, pneumonia and pleurisy, measles or whooping cough. Contrary to other reports, no difference in incidence was noted between boys and girls.

CRANE, Chicago.

THE DIAGNOSIS AND THE DIFFERENTIAL DIAGNOSIS OF PULMONARY ABSCESS IN THE OLDER CHILD. S. MÜLLER, Arch. f. Kinderh. **108**:224 (Aug. 4) 1936.

Six cases are presented, and the differentiation of the condition from encysted interlobar empyema, tuberculous cavity and encysted pyopneumothorax is discussed.

CRANE, Chicago.

TREATMENT OF PULMONARY SUPPURATIONS WITH HYPERTONIC SALT SOLUTION. R. S. BERKMAN and V. M. DOKSHIZKAYA, Vrach. delo **19**:1069 (Dec.) 1936.

Twelve patients with pulmonary suppuration were treated with intravenous injections of hypertonic salt solution. About nineteen injections were given to each patient. In each of nine of the twelve patients roentgen examination showed a large cavity (12 cm. in diameter in one of the cases). Under the treatment mentioned each patient's temperature became normal, and the sputum and odor, as well as the cavity, disappeared. The patients gained from 4 to 19 Kg. in weight. One patient died, but the others have maintained their working capacity up to date. No exacerbation of the process was noticed in any.

The authors believe that their observations allow them to recommend intravenous injections of salt solution for pulmonary suppuration. They likewise point out that this method has the advantage of being safe and practicable under any condition.

BODER, Los Angeles.

Diseases of the Gastro-Intestinal Tract, Liver and Peritoneum

FORM AND DIMENSIONS OF THE PALATE DURING THE FIRST YEAR OF LIFE. H. BAKWIN and RUTH M. BAKWIN, Internat. J. Orthodontia **22**:1018 (Oct.) 1936.

This is a study of 428 infants of Caucasian stock who were either healthy or had only minor infections of the upper respiratory tract. Wax impressions were taken and casts poured from these. The results show that during infancy the palate is relatively broad and flat and the dental sacs usually plainly outlined. The palatal dimensions are poorly correlated with each other and with other dimensions of the body. During the first year the breadth-height index of the palate remains unchanged, while the palatal height becomes relatively greater and the place of maximum breadth moves posteriorly.

LEWIS, Dayton, Ohio. [ANGLE ORTHODONTIST.]

A CLINICAL STUDY OF THE APPLE DIET IN THE TREATMENT OF DIARRHEA IN INFANTS. E. E. SMITH and R. I. FRIED, J. Pediat. **10**:495 (April) 1935.

Ninety patients with diarrhea, fifty in the hospital and forty in the dispensary, were treated with the diet of scraped raw apples. In most cases a twenty-four hour period of starvation was instituted prior to the apple diet. When necessary, parenteral fluids were administered, and the mineral balance was maintained by administering calcium. The authors concluded that the apple diet was of no value in the treatment of dysentery. In the mild and in the severe diarrhea of infancy the results obtained with this diet were no better than those obtained with treatment of any other type. It is the belief of the authors that the beneficial results obtained with the apple diet were due to the period of starvation and the rest induced in the gastro-intestinal tract by the bland, nonirritating qualities of the apples.

RAUH, Cincinnati.

CONGENITAL ABSENCE OF THE VERMIFORM APPENDIX IN A PATIENT WITH MENTAL DISEASE. L. W. DARRAH, New England J. Med. **214**:776 (April 16) 1936.

Congenital absence of the vermiform appendix is exceptionally rare. According to the ultracritical reviewers of the literature on this subject, there have been seemingly but twenty-eight authentic reported cases in the past two hundred and sixteen years! A case found at autopsy—with no record or evidence of any operation—merits reporting: A woman aged 55, who had been a patient in the Gardner State Hospital for nine years, was considered a schizophrenic paranoid type. She was debilitated both mentally and physically and died of gastric ulcer. At autopsy the appendix could not be located. The anterior tenia, said to be the surest guide to the process, was followed to its termination, at which point the cecum was smooth. The point of junction of the three teniae was thoroughly examined. Not even a rudimentary projection could be found. The serosal surface of the cecum was everywhere smooth. The rectocecal fold and fossa were also explored. The cecum was the usual lop-sided adult form with nothing else remarkable about its appearance.

GENGENBACH, Denver.

ALTERATION IN SERUM PROTEINS AS AN INDEX OF LIVER FAILURE. E. F. FOLEY, R. W. KEETON, A. B. KENDRICK and DUANE DARLING, Proc. Soc. Exper. Biol. & Med. **33**:430 (Dec.) 1935.

In twenty-one patients with decompensated cirrhosis of the liver there were constant hypo-albuminemia and hyperglobulinemia with an albumin-globulin quotient of 0.55 instead of the normal average, 2.48. There seemed to be a poor prognosis for these patients. In three patients with extrahepatic jaundice due to stones there was a reversal of the albumin-globulin ratio; all of these patients died. Another patient with a similar condition but without these findings in the blood recovered. Slight changes were found in such conditions as malignant obstructive jaundice, intrahepatic jaundice, catarrhal jaundice and various types of ascites. From this study it seems that in grave injury to the liver there is a lowering of the albumin and an elevation of the globulin in the serum, giving a reversal of the albumin-globulin ratio. This indicates that the liver is an important site of formation of serum albumin and that alterations in the serum proteins are an index of hepatic failure.

HANSEN, Minneapolis.

TWO CASES OF HYPERTROPHIC PYLORIC STENOSIS TREATED WITH EUMYDRIN. HELEN MACKAY, Proc. Roy. Soc. Med. **29**:1210 (Aug.) 1936.

Two children aged 3 months and 2½ months, respectively, showed loss in weight and visible gastric peristalsis, and a palpable tumor was present. Each vomited in a projectile manner. A roentgenogram of each baby showed that little of a barium meal had passed out of the stomach after three and one-half hours.

The patients were given 2.5 cc. of a 1:10,000 solution of atropine methyl nitrate one-half hour before each feeding. The full treatment and the results, as well as the author's comment, are given.

WILLIAMSON. New Orleans.

DUODENAL STENOSIS. R. W. B. ELLIS and DAVID LEVI, Proc. Roy. Soc. Med. **29**: 1213 (Aug.) 1936.

A boy 1 week old was taken to the hospital because of vomiting, which was forcible in type and contained bile. Roentgen examination showed duodenal stenosis. The stomach was still full after two hours, a very small quantity of barium sulfate having passed into the small intestine. The abdomen was opened, and gastro-enterostomy was performed. The postoperative progress is given in the report, and the roentgenograms taken before and after operation are shown.

WILLIAMSON, New Orleans.

EVENTRATION OF THE DIAPHRAGM AND ITS CLINICAL ASPECTS. L. I. BRAUN, South African M. J. **10**:570 (Aug. 22) 1936.

Since 1932 Braun has seen twelve cases of eventration of the diaphragm, in all of which the condition had been diagnosed by fluoroscopic examination and in not one by ordinary physical examination. The characteristic features of the condition found by fluoroscopy are: a strikingly high elevation of the left dome (rarely the right); displacement of the heart to the right; upward displacement of the stomach and marked displacements of the colon. The symptoms complained of can be divided into two main groups: (1) those reflecting on organs above the diaphragm, suggestive of a cardiac or pulmonary lesion, and (2) those resulting from interference with the physiologic working of organs below the diaphragm, suggesting a gastric, cholecystitic or colonic lesion. In the first group the symptoms most commonly simulate those of angina pectoris. In the second group the most common complaint is obstinate constipation. GONCE, Madison, Wis.

A CONTRIBUTION TO THE STUDY OF MICROCOLON AND HIRSCHSPRUNG'S DISEASE. H. SLOBOZIANO and E. C. CRACIUM, Arch. de méd. d. enf. **39**:519 (Aug.) 1936.

In reporting a typical case of microcolon and another of Hirschsprung's disease, these clinicians of Bucharest, Rumania, support the view of Okinczyc that these apparently opposed malformations of the intestine represent different stages of the same morbid process.

Numerous observations have been published to confirm the opinion that megacolon, for example, may follow spastic hypertrophy of the rectum as a whole or in part, or it may have its origin in simple hypogenesis of the terminal portion of the ileum.

Roentgenologic examinations throw much light on the pathogenesis as well as aid in the diagnosis. AMESSE, Denver.

HEMIPLEGIC FORMS OF HUTINEL'S DISEASE. A. CARRAU, H. MOURIGÁN and C. BARBEROUSSE, Arch. de méd. d. enf. **39**:826 (Dec.) 1936.

Hutinel described a syndrome of cardiotuberculous or cardiosyphilitic cirrhosis the manifestations of which depend on the lesions uppermost at the moment; the symptoms may originate in the cirrhosis itself or in the accompanying pericarditis, tuberculosis or syphilis.

In spite of the clinical polymorphism which thus develops, there is a certain similarity in the evolution of the syndrome in all cases. The entire tableau of Hutinel's disease centers about a heart imprisoned in a damaged pericardium and an ascites which successfully resists all treatment.

In the several observations reported in considerable detail by the authors, a feature not commonly described in this disorder is reported. All of the subjects, varying in age from 7 to 10 years, presented cerebral phenomena, with convulsions and right hemiplegia, of obvious embolic source.

Examinations post mortem showed that these emboli originated in tuberculous foci of the myocardium or of the parietal endocardium, without the presence of either acute or chronic valvular lesions. Serologic investigations for syphilis in these cases gave negative results. AMESSE, Denver.

MESENTERIC CYSTS. C. LUGONES and D. A. MOLINE, Rev. méd. latino-am. **31**:1282 (Aug.) 1936.

Mesenteric cysts were removed at operation from a man of 26 years and two children aged 4 and 7 years. The cyst removed from the man was a dermoid; the other two were serous cysts. The authors conclude that such cysts are always congenital. DWYER, Kansas City, Mo.

EVENTRATION OF THE DIAPHRAGM. L. R. PERELMANN and F. M. OLSHINSKI, Vrach. delo **19**:1073 (Dec.) 1936.

The authors describe eventration of the diaphragm as observed in five patients, four being young adults. In each one the eventration was brought on by an acute trauma inflicted by a fall during gymnastic procedures. The main symptoms in all were: acute pain in the lower left side of the chest, made worse by deep inspiration, and a feeling that something in the chest had given in. Roentgen examination revealed marked elevation of the diaphragm at the left side, the upper border being located at the level of the fourth or fifth rib, the margins of the diaphragm being regular and the surface intact. The latter point, according to the authors, aids greatly in the differentiation of this condition from diaphragmatic hernia. It is pointed out that eventration of the diaphragm should be ruled out in the presence of any injury to the chest. Neither the mechanism of the eventration nor the fact that the left side of the diaphragm is most frequently involved are clearly understood. The authors' conclusions are as follows:

1. Eventration of the diaphragm is not an uncommon disease, though it commonly remains undiagnosed.

2. Roentgen examination holds the first place among the procedures used for the diagnosis of this condition.

3. Trauma is the chief cause of eventration of the diaphragm, which may appear suddenly or as a result of continual slight traumatic influences.

4. Though eventration of the diaphragm is a serious anatomic abnormality, the organism may adjust to it functionally so completely as to retain its functional ability almost to a normal degree.

BODER, Los Angeles.

A FOREIGN BODY IN THE STOMACH IN A BOY PREVIOUSLY TREATED FOR PYLORIC STENOSIS. A. WALLGREN, Svenska läk.-tidning. **33**:1321 (Sept. 4) 1936.

The boy was treated internally for a typical clinical and roentgenologic congenital pyloric stenosis and was discharged free from vomiting. The roentgen signs of pyloric stenosis were still present at the age of 1 year. When 1½ years of age he one day swallowed his mother's wedding ring, and this passed with the stools seven weeks later. A new roentgen examination revealed the presence of a remaining stenosis of the pyloric canal through which the ring had passed. Apparently with muscular hypertrophy and the stenosis produced by it there is a high degree of distensibility, particularly in the case of the muscular hypertrophy remaining after clinical healing.

WALLGREN, Göteborg, Sweden.

PERSISTING ROENTGEN SIGNS OF CONGENITAL PYLORIC STENOSIS AT THE AGE OF TEN. A. WALLGREN, Svenska läk.-tidning. **33**:1322 (Sept. 4) 1936.

A boy had been treated internally for typical pyloric stenosis during the first two and a half months of life. He was discharged healthy and was next seen at the age of 10 years. For some time, especially during the last year, he had complained of a sense of pressure and tension in the abdomen after somewhat voluminous meals. No vomiting had occurred. A roentgenologic examination showed an evident but slight stenosis of the pyloric canal with a somewhat prolonged emptying time of the stomach.

WALLGREN, Göteborg, Sweden.

STOMATITIS APHTHOSA ASSOCIATED WITH CUTANEOUS ANOMALIES. W. L. L. CAROL and C. POSTMA, Nederl. tijdschr. v. geneesk. **80**:3554 (Aug. 1) 1936.

This is a description of a case of stomatitis aphthosa in a baby of 14 months with aphthas of the face. Spontaneous recovery occurred in three weeks. There is discussion of the differentiation of the condition from impetigo vulgaris.

VAN CREVELD, Amsterdam, Netherlands.

SEVERE PAINS IN SO-CALLED ICTERUS CATARRHALIS. J. D. SCHENDSTOK, Nederl. tijdschr. v. geneesk. **80**:3841 (Aug. 22) 1936.

Schendstok describes three cases of icterus catarrhalis in girls 10, 15 and 13 years old, in which severe abdominal pains in the preicteric stage of the disease suggested the presence of a surgical abdominal condition.

VAN CREVELD, Amsterdam, Netherlands.

Nervous Diseases

ARHINENCEPHALY WITH EXTREME EVERSION OF THE END-BRAIN. HARTWIG KUHLENBECK and JOSEPH H. GLOBUS, Arch. Neurol. & Psychiat. **36**:58 (July) 1936.

A girl born at full term became intensely cyanotic one hour after birth. In addition, there were moderate exophthalmos and a tense fontanel. Lumbar puncture yielded a bloody fluid. She died on the fourth day.

At postmortem examination, the condition was found to be arhinencephaly. There was hydrocephalus, with a protruding membranous hydrocephalic sac, an end-brain incompletely divided into hemispheres, an exposed cerebellum, absence of olfactory bulbs and tracts and a nearly normal brain stem.

This type of malformed brain is closely related to cyclopia. The authors suggest that such abnormalities may be due to intrinsic influences going on as far back as the fertilized egg or the first formation of the medullary fold.

BEVERLY, Chicago.

CONGENITAL ATRESIA AND STENOSIS OF THE AQUEDUCT OF SYLVIUS: AN ANATOMIC STUDY OF SIX CASES. H. N. ROBACK and M. L. GERSTLE JR., Arch. Neurol. & Psychiat. **36**:248 (Aug.) 1936.

Roback and Gerstle report six cases of stenosis of the aqueduct of Sylvius. In four of the cases there was spina bifida; in the fifth there were anomalies of the toes. The infants lived from two days to three months. In three of the cases there was complete occlusion, and in the other two, narrowing of the aqueduct. Theories as to the cause of the condition vary from that which regards it as due to developmental error to that which ascribes it to an inflammatory process during fetal life.

BEVERLY, Chicago.

CORTICAL ENCEPHALOMALACIA IN INFANCY: A CONTRIBUTION TO THE STUDY OF INFANTILE CEREBRAL PARALYSIS. P. M. LEVIN, Arch. Neurol. & Psychiat. **36**:264 (Aug.) 1936.

An infant began to have convulsive seizures at 4 months of age and hemiplegia at 9 months, with death a few days later. On pathologic examination of the brain, multiple laminar softenings were noted throughout the cerebral cortex, most marked in the parietal regions. The pial arteries showed calcification of the media. Intimal proliferation was present in these vessels and in the large basal arteries.

The author reviews other reported cases of cortical encephalomalacia in infants. The condition appears to represent an early stage of diffuse cerebral sclerosis. Alteration in the circulation of the cerebral cortex is the cause of the condition. Vascular occlusion is rarely found. It is suggested that vasomotor changes may play an important rôle.

BEVERLY, Chicago.

A SPECIFIC EPILEPTIC SYNDROME RELIEVED BY LYSIS OF PACCHIONIAN GRANULATIONS: PRELIMINARY REPORT OF THREE CASES. J. E. SCARFF, Arch. Neurol. & Psychiat. **36**:373 (Aug.) 1936.

Three patients presenting a specific epileptic syndrome were cured by lysis of pacchionian granulations found at operation. The syndrome consists of: (1) an

onset of the illness in infancy or early childhood with slow progression; (2) limitation of the convulsions to one foot or leg for many years, with generalization later; (3) in some cases slight underdevelopment of the affected member.

BEVERLY, Chicago.

MULTIPLE HEREDITARY HEMANGIOBLASTOMAS OF THE NERVOUS SYSTEM. P. M. LEVIN, Arch. Neurol. & Psychiat. **36**:384 (Aug.) 1936.

A case of multiple hemangioblastomas of the central nervous system is reported in which a pathologic diagnosis was made preoperatively on the basis of the family history and the location of the tumors. Levin emphasizes the frequency with which hemangioblastomas of the spinal cord are found in the presence of lesions elsewhere.

BEVERLY, Chicago.

PROGNOSIS OF LETHARGIC ENCEPHALITIS IN CHILDHOOD. WILLIAM HEALY, Arch. Neurol. & Psychiat. **36**:921 (Nov.) 1936.

The author reviews eight cases of lethargic encephalitis with changes in personality which were studied and followed at the Judge Baker Guidance Center. He concludes that an accurate prognosis cannot be made. The mildness of onset, the difficulty of early diagnosis, and the absence or slight degree of neurologic and somnial disturbances in some cases cause the author to wonder if lethargic encephalitis is the cause of at least some pathologic personalities and, in part, of the hyperactivity of some delinquent children.

BEVERLY, Chicago.

MENINGO-ENCEPHALOMYELITIS NEONATORUM: ANATOMIC REPORT OF A CASE. RICHARD RICHTER, Arch. Neurol. & Psychiat. **36**:1085 (Nov.) 1936.

A cold developed in a 7 week old baby; one week later the child had convulsions, became comatose and died of bronchial pneumonia. Microscopic studies of the brain indicated a true infectious nonsuppurative meningo-encephalomyelitis.

BEVERLY, Chicago.

EPIDEMIC ENCEPHALITIS (ST. LOUIS TYPE) IN TOLEDO, OHIO. K. LÖWENBERG and T. ZBINDEN, Arch. Neurol. & Psychiat. **36**:1155 (Dec.) 1936.

The authors describe an epidemic (fifty cases) of encephalitis which occurred in Toledo, Ohio, in the summer of 1934. Clinical and pathologic studies indicated the disease in this epidemic was of the same type as that in the epidemic in St. Louis.

BEVERLY, Chicago.

CONGENITAL MALFORMATION OF THE CEREBRUM ASSOCIATED WITH MICROCEPHALY. CYRIL B. COURVILLE, Bull. Los Angeles Neurol. Soc. **1**:*2* (March) 1936.

Courville reports the case of an infant aged 17 days with a small head (31 cm. in circumference), closed fontanels, cleft lip and palate, absence of the nasal septum and almost constant convulsions and nystagmus. Death occurred at the age of 61 days. Necropsy revealed that the cerebrum occupied only the anterior one third of the cranial vault. The posterior two thirds was occupied by a thin-walled sac, the cavity of which opened directly into the cerebrum. The aqueduct of Sylvius lay open in the floor of the sac, and the thalami and corpora quadrigemina were at the sides of the opening. The cerebrum was a thin shell of cortex with a few external markings, no corpus callosum and only a tendency to divide into two hemispheres. The leptomeninges were thickened at the base, and this involved the cranial nerves. The olfactory bulb, olfactory tract and olfactory trigon were absent bilaterally. The pons was small; the pyramidal tracts were absent, and the cerebellum was relatively normal in size. Courville remarks on the occurrence of convulsions in the absence of motor fibers in the brain stem. He considers the condition a developmental anomaly dating from early embryonic life.

MACKAY, Chicago. [ARCH. NEUROL. & PSYCHIAT.]

THE INITIAL SYMPTOMS AND EARLY DIAGNOSIS OF TUMORS OF THE BRAIN. ISRAEL STRAUSS, Bull. New York Acad. Med. **12**:467 (Aug.) 1936.

Theoretically, the earlier a tumor of the brain is recognized and treated the better should be the results. An analysis of one hundred unselected cases of tumor of the brain observed in the neurologic service of the Mount Sinai Hospital in New York showed that poorer results were obtained in many persons in whom the symptoms of neoplasm led to early diagnosis and treatment than in those in whom the manifestations of the tumor were slow in onset and diagnosis was delayed. In those cases in which the signs appeared late, success in operation was more prevalent.

Rapidly growing tumors are characterized by aphasia, headache and mental changes. The symptoms are severe and disabling. Thus they attract early medical attention. Slow growing tumors are usually accompanied by visual disturbances, headache and convulsions. These are transitory early in the disease and are often so indefinite as to detract from attention to their underlying cause. Diagnosis and treatment are therefore delayed. Forty-eight patients in the series studied presented papilledema. This sign was prevalent in the cases of long duration; it was seen only occasionally in those of brief duration, because in these cases the neoplasms were recognized before papilledema made its appearance.

For a comprehensive review and a practical appreciation of the subject described, the reader is urged to study the original paper. JAHR, Omaha.

RHINORRHEA AND NEOPLASMS OF THE CENTRAL NERVOUS SYSTEM. ROBERT E. BRITT, J. Nerv. & Ment. Dis. **81**:654 (June) 1935.

Spontaneous escape of spinal fluid from the nose is usually associated with severe injury to the head or nose, a nasal infection, a complication of an intranasal surgical procedure, a congenital anomaly, meningitis or a tumor of the brain. The last-named condition is the most frequent cause of drainage of spinal fluid through the nose, and in the two cases reported it was undoubtedly due to increased intracranial pressure.

A 16 year old boy for whom a diagnosis of cerebellar tumor was made presented along with other symptoms and signs leakage of a yellowish fluid from the right nostril. At 4 years of age he suffered from severe frontal headaches, dizziness, unsteadiness of gait and a tendency to fall toward the right. At that time a diagnosis of polioencephalitis was made. Two years later projectile vomiting developed and choked disks and cerebellar signs made their reappearance. Roentgenograms of the skull at that time showed thinning of the bones. Suboccipital decompression was followed by paralysis of the left extremities which lasted four months. Two years later a second operation was performed, and 17 cc. of amber-colored fluid was removed from the cerebellum, as well as tumor tissue. For eight years he received radium treatment at intervals.

Six months prior to death pain developed in the right lower extremity, with numbness in the upper third of the right side of the face, diplopia, convulsions and a discharge of yellowish fluid from the nose.

Lumbar puncture showed xanthochromic fluid under normal pressure. A roentgenogram of the skull showed enlargement of the sella turcica and partial destruction of the posterior clinoid processes.

Stupor and high fever set in twelve days after his admission to the hospital. The patient responded to medication at first but died five weeks later.

Postmortem examination showed a tumor in the posterior fossa. There were thinning of the bone of the skull, erosions of the lamina cribrosa and tears in the pia-arachnoid over the region of the right orbital and subcallosal and both temporal convolutions. "The cortical tissues in these regions contained lacerations which permitted the escape of cerebrospinal fluid through the lamina cribrosa." Partial destruction of the posterior clinoid processes as well as enlargement of the

sella turcica can be accounted for on the basis of distention of the pia-arachnoid from accumulation of spinal fluid in the floor of the third ventricle (internal hydrocephalus).

The second case was that of a man 28 years of age, who was apparently suffering from a deep-seated neoplasm in the brain. His symptoms of tumor appeared first in 1921. Rhinorrhea set in in 1931. Britt attributes the nasal discharge of spinal fluid together with other neurologic findings which the patient presented to erosion of the sella turcica or internal hydrocephalus. JAHR, Omaha.

PNEUMOCOCCUS MENINGITIS: REPORT OF A CASE WITH RECOVERY. J. F. BENNETT and H. J. MEIER, Wisconsin M. J. **35**:630 (Aug.) 1936.

The authors found fifty instances of pneumococcic meningitis with recovery reported in the literature. They report an additional case in which recovery occurred. The patient, a 9 year old girl, showed symptoms of meningeal disease two and one half weeks after the onset of otitis which was due to the pneumococcus. The symptoms had disappeared by the fifteenth day after one relapse at the end of the first week. The treatment consisted of five blood transfusions, several intravenous administrations of dextrose and saline solution and thirteen spinal punctures; no specific serum was given. The otitis cleared up during the course of the meningitis. JANNEY, Wauwatosa, Wis.

PARALYSIS DUE TO POSTURE. E. B. CLAYTON, Brit. M. J. **2**:280 (Aug. 8) 1936.

Clayton discusses the effect of postures resulting in pressure on the nerves and further resulting in temporary or prolonged paralysis in several extremities. He admits that in some of the cases the ill effects are probably due to pressure only, while in others they may be due to a septic focus affecting the circulation in the limbs. A number of cases are reported, all in adults.

ROYSTER, University, Va.

ON SOME CONSTITUTIONAL ASPECTS OF CHOREA AND ITS SEQUELAE. E. GUTTMANN, J. Neurol. & Psychopath. **17**:16 (July) 1936.

There is a general impression based on textbook information that chorea, unless it is accompanied by cardiac involvement, is a rather mild condition from the point of view of ultimate prognosis. Actually, however, aside from the pathologic condition of the heart, nervous and psychic complications of the disease are important factors that beg appreciation. One author stated: ". . . some mental instability may persist for a long time and slight involuntary movements may be perpetuated as a habit." This paper deals with a study of chorea and its relation to psychoses. Analysis of the histories of psychotic patients shows a high incidence of chorea in the immediate family or in close relatives. Among these patients the incidence of chorea is much higher than that for the general population. There is an impressive relationship between chorea and schizophrenia. JAHR, Omaha.

A CASE OF CHOREA GRAVIS TREATED WITH AVERTIN. LESLIE COLE, Lancet **2**:1213 (Nov. 21) 1936.

In this paper is reported the case of an 11 year old girl with marked choreiform movements, which "became so severe that she could not swallow solids, and could hardly sleep, speak or drink." Except for slight enlargement to the left, no cardiac abnormality was found.

For the first forty-eight hours in the hospital, scopolamine, phenobarbital and bromides apparently produced no quieting effect. A dose of 2.5 cc. of tribromethanol, (0.1 Gm. per kilogram) was given rectally under anesthesia with chloroform. The patient was asleep within a quarter of an hour, and the movements were controlled for four hours, after which tribromethanol was again administered,

the dose being regulated by the severity of the returning movements. Food was given by nasal tube for the next ten days, and treatment with tribromethanol had to be continued for twenty-one days. Cyanosis was the most troublesome symptom and was relieved by nasal administration of oxygen and injection of atropine sulfate.

In this patient no ill effects were noted on discharge, and the levulose tolerance test showed no evidence of damage to the liver LANGMANN, new York.

VENTRICULAR COMMUNICATION AND INTERNAL HYDROCEPHALUS AS COMPLICATIONS OF BRAIN ABSCESS. FRANCIS MCGUCKIN, Lancet **2**:1387 (Dec. 12) 1936.

Three cases of otogenic abscess of the temporal lobe, in which recovery followed establishment of ventricular communication, form the basis of this report. These cases demonstrate that tension may be severe and that its relief under certain circumstances may make for rapid recovery. In one case the abscess was sufficiently large to cause extensive compression of the homolateral ventricle, and the large amount of cerebrospinal fluid evacuated would point to the rupturing segment as probably the anterior horn and adjacent part of the body.

If intervention is not delayed unduly, evacuation of the content of the abscess will usually relieve the pressure responsible for the block in cerebrospinal circulation and will accomplish this much more safely than will direct intervention with the system. LANGMANN, New York.

ENCEPHALOMYELITIS. F. H. COLEMAN, Proc. Roy. Soc. Med. **29**:1217 (Aug.) 1936.

A girl aged 4 years was admitted to the hospital on account of difficulty in walking. She had had an attack of measles seven weeks previously and stayed in bed three weeks. The mother noticed that on getting up she did not walk as well as her other child, who also had had measles. She had gradually grown worse; her speech took on a nasal quality, and her head flopped forward. Examination showed paralysis of the left external rectus muscle and ptosis of the left lid. The grip was weak in each hand. The power of the legs was impaired. The knee and ankle jerks were absent. The abdominal reflex was sluggish. The right ear was discharging, and this had persisted since the attack of measles. All the investigations, which are reported in detail, gave negative results. When seen four months later, the child showed no change in her condition.

WILLIAMSON, New Orleans.

THE RÔLE OF CALCIUM IN SPONTANEOUS OVERBREATHING TETANY. C. G. BARNES and R. I. N. GREAVES, Quart. J. Med. **5**:341 (July) 1936.

Three cases of spontaneous overbreathing tetany are described. A drop in the calcium content of the spinal fluid was detected during the tetany. Barnes and Greaves express the belief that the calcium content of the spinal fluid is an index of the diffusible calcium in the blood and that alkalosis occurring in this condition brings about a decrease in the diffusible calcium.

An injection of an alkaline solution of a calcium salt into one of the patients during tetany relieved the attack. BRADFORD, Rochester, N. Y.

CEREBRAL ANGIOMAS: THE IMPORTANCE OF CEREBRAL ANGIOGRAPHY IN THEIR DIAGNOSIS. EGAS MONIZ, Bull. Acad. de méd., Paris **113**:174 (Feb. 5) 1935.

Egas Moniz distinguishes three types of angioma: arterial, venous and arteriovenous. Immediately after injection of thorium dioxide into the common carotid artery, roentgenograms of an arterial angioma can be obtained (arteriography). Films taken four or five seconds later show a venous angioma (phlebography).

Egas Moniz recounts the case of a girl aged 16 who had diminution of vision, "neuroretinitis of renal type," with atrophy of the optic nerve and severe headaches and vomiting but no signs permitting localization. Both arteriography and phlebography revealed normal vessels on the right; a large arteriovenous aneurysm was discovered when injection was made on the left side. The arteriogram revealed, in addition to the dilated and abnormal arteries, numerous venous channels already filled with the contrast medium, evidently by direct communication with the arteries. Films taken five seconds later showed the venous portion then filling from the capillaries. The patient was treated by ligation of the common carotid artery, with temporary success. Moniz emphsizes the value of angiography in the diagnosis and localization of intracranial vascular tumor.

MACKAY, Chicago. [ARCH. NEUROL. & PSYCHIAT.]

PROGRESSIVE UNILATERAL RIGIDITY WITH CHOREO-ATHETOSIS AND TORSION SPASMS ABOUT THE LONGITUDINAL AXIS. G. BOUCHE and L. VAN BOGAERT, Rev. neurol. **64**:886 (Dec.) 1935.

The illness began at the age of 10 years, during convalescence from acute rheumatic fever, and was characterized by contraction of the left foot associated with equinovarus, extending later to the arm, with marked hypertonus. The first torsion spasms began about five years after the onset of hypertonus. A few minutes before the onset of the spasm the patient felt vague uneasiness and excitement but remained conscious and at times by energetic countersuggestion could inhibit the attack. There was never biting of the tongue or loss of sphincter control, but he complained of intense pain in the mouth and the whole left side of the body. During the attacks the head turned to the right, the face became flushed, the eyelids contracted, the pupils dilated, the mouth opened wide, and the tongue protruded, covered with thick saliva. Meanwhile, the left arm became extended, the hand flexed and pronated on the wrist, the thumb became enclosed within the fingers, and extension of the leg and foot increased. The patient turned toward the right, and at the height of the crisis respiration was arrested. A few mild clonic movements and some erection of hairs over the shoulders, with profuse and generalized sweating, terminated the crisis.

The patient had these attacks for five years before succumbing to subacute bacterial endocarditis with septicemia. There were marked alteration in the heart and kidneys and an early stage of cirrhosis of the liver. The brain showed diffuse chronic meningo-encephalitis. There was an abiotrophic process in the globus pallidus, particularly on the right, with involvement of the external segments of the subthalamic bodies. It was characterized by diminution in the number of cells and marked reaction on the part of the glia, without much fibrillar gliosis and with minimal disturbance in the myelin pattern. The lesions were especially marked in the inner segments of the globus pallidus and the outer segments of the corpus subthalamicum. Nevertheless, the pallidosubthalamic connection showed little change. The cortical and subcortical lesions were probably not responsible for the condition.

FREEMAN, Washington, D. C. [ARCH. NEUROL. & PSYCHIAT.]

THE FATE OF INFANTS TREATED FOR TETANY IN THE WÜRZBURG UNIVERSITY CLINIC IN THE YEARS 1918-1925. G. HERKERT, Arch. f. Kinderh. **108**:193 (Aug. 4) 1936.

Of 119 infants treated for tetany during this period, 92 could be traced at a period from ten to seventeen years later. In general, these children were physically well developed and of average mentality. The number showing neuropathic symptoms was unusually high, but whether this can be attributed to the fact that these children had had spasmophilia is open to question. The prognosis for the further development of children with tetany is good.

CRANE, Chicago.

HYDROCEPHALUS AND THE INTERNAL EAR. L. KRAUS, Hals-, Nasen- u. Ohrenarzt (Teil 1) **27**:64 (March) 1936.

Kraus reports a case of deaf-mutism with hydrocephalus in a man who had had these defects since birth and who died at the age of 61. The author describes the results of the postmortem examination and particularly the histologic studies on the ears. The most noteworthy observations on the internal ear were (1) vesicular dilatation and displacement of the contents of the perivascular and perineural lymph spaces of the modiolus of the cochlea, (2) a deficient development of the vestibular portion of the ductus cochlearis and (3) the sheathing of Corti's membrane with a nucleated covering. The author assumes that mild intra-uterine serous meningitis resulted in the hydrocephalus and in serous labyrinthitis. The latter caused the deformities and the inflammatory changes in the internal ear. The continuous pressure on the brain resulted in the dilatation of the lymph spaces. Thus, the defects are the result of a serous inflammation which took place while the internal ear was still in the stage of development.

EDITOR'S ABSTRACT. [ARCH. OTOLARYNG.]

EPILEPSY AND THE LAW OF EUGENICS. H. STEFAN, Med. Klin. **32**:1133 (Aug. 21) 1936.

Stefan cursorily notes the customary clinical and laboratory means of differentiating hereditary epilepsy from other forms of epileptic symptom complexes. After ruling out the so-called epilepsies due to lesions of the brain he states that the most effectual treatment of epilepsy is its prevention and that prevention is to be accomplished by sterilization of those persons with "hereditary and genuine" epilepsy.

DOOLEY, New York.

PROTEIN FRACTIONS OF THE CEREBROSPINAL FLUID IN CHILDHOOD. PAUL UJSÁGHY, Monatschr. f. Kinderh. **66**:137 (July) 1936.

Two hundred and sixty-two specimens of spinal fluid were examined from 58 well and 122 sick children. Tables show results of quantitative analysis for the total protein, globulin, pseudoglobulin, euglobulin and fibrinogen. Premature infants show a much higher content of these fractions than do full term children. From six months to a year after birth the premature infant approaches the normal. In purulent meningitis the protein is of course increased, and in tuberculous meningitis to a much less extent. Fibrinogen is increased in both instances. In encephalitis the total protein may be greatly increased, with the exception of the form due to influenza. In brain tumor there may be a diminution of protein, and in epilepsy and chorea the findings are indefinite. In syphilis the protein is not necessarily increased, though there may be some euglobulin and fibrinogen. Syphilitic meningitis is characterized not only by a high total protein content but also by a relative increase in euglobulin and fibrinogen.

GERSTLEY, Chicago.

BRAIN TUMOR IN A CHILD. JOSEF LUTZ, Monatschr. f. Kinderh. **66**:155 (July) 1936.

Lutz reports a case of a 4 year old boy whose symptoms resembled those of tuberculous meningitis. The tumor proved to be a cherry-sized carcinoma of the plexus in the posterior horn of the left ventricle. There were many metastases, with chronic meningitis and edema of the brain.

GERSTLEY, Chicago.

PURULENT MENINGITIS IN THE LEIPZIG CHILDREN'S CLINIC. M. K. ANSPACH, Monatschr. f. Kinderh. **66**:364 (Aug.) 1936.

This is a statistical review for the years 1924-1934. Of 262 cases of purulent meningitis, in 82 the condition was due to the pneumococcus, in 73 to the meningo-

coccus, in 46 to the streptococcus, in 30 to the influenza bacillus, in 8 to the staphylococcus and in 6 to the colon bacillus. The disease affected mostly children under 3 years of age. In meningococcic meningitis, the mortality was 64.3 per cent, while in the forms due to the pneumococcus, streptococcus and colon bacillus it was 100 per cent. In a final check-up, it was found that the mortality of the children who had been discharged was unusually high during the subsequent years.

GERSTLEY, Chicago.

ALBUMIN FRACTIONS OF THE SPINAL FLUID IN CHILDHOOD. PAUL UJSÁGHY, Monatschr. f. Kinderh. **67**:429 (Dec.) 1936.

Determinations of the albumin, globulin, pseudoglobulin, euglobulin and fibrinogen in the spinal fluid were made in the course of a variety of the acute infectious diseases. In the milder infections no abnormality was found. In the severe, and particularly in the toxic, forms the protein content increased. In addition, euglobulin and fibrinogen, which are normally absent, made their appearance. In fact, the determination of these latter substances is an important factor in determining the severity and the toxicity of the infection. The relationship of protein content to the severity of the infection is not apparent quantitatively.

GERSTLEY, Chicago.

ANATOMIC AND PATHOLOGIC FEATURES OF MONGOLOIDISM. W. H. STEFKO and L. IVANOWA, Bull. Soc. roumaine de neurol. **26**:57, 1935.

The pathologic changes in three mongoloid idiots aged 3, 9 and 10 years, respectively, are described. The thyroid gland, the lungs and the adrenal glands showed immature structure, particularly the thyroid, which was described as fetal. The gyri of the cerebral cortex, particularly the precentral, postcentral and central, were all flattened. Anastomoses and supplementary sulci were not developed. The occipital lobe presented anomalies. The sulcus occipitalis transversus and the sulcus parieto-occipitalis were deep and joined the sulcus intraparietalis, thus delimiting entirely the occipital lobe. Cyto-architectonic study showed in area praecentralis gigantopyramidalis lack of development of layers V and VI and, to some extent, of layer I. The giant pyramidal cells were round. In area frontalis agranularis, layers I and VI were thick. Layer III was thinner than layer I, and its cells were irregularly disposed. In area frontalis intermedia, layer III was broad, and layers V and VI were not distinguishable from one another, both having the structure of layer V. Area frontalis granularis showed considerable lack of development; layer VI, in particular, was two-fifths the normal thickness. In all the areas of the inferior frontal region, the thickness of the cortex was diminished. Many of these peculiarities, both of the brain and of other organs, resemble those of adult members of the mongolian race, whose development in certain respects is arrested at a level corresponding to that of the European age level of about 5 years. The authors believe that mongoloidism is a distinct genotype.

LIBER, New York. [ARCH. NEUROL. & PSYCHIAT.]

NUCLEAR APLASIA OF MOEBIUS COMBINED WITH ARHINENCEPHALY. A. BIEMOND, Acta psychiat. et neurol. **11**:49, 1936.

Biemond describes the case of a child who since birth presented ptosis of the left eyelid, slight convergent strabismus, with paresis of vertical movements of the left eye, and peripheral paralysis of the right facial and accessory nerves. The child died at the age of 10 months of bronchopneumonia. Portmortem study of the brain revealed incomplete development of the circle of Willis, absence of the right vertebral artery, agenesis of both olfactory nerves and hypoplasia of the commissural systems of the forebrain (rostrum corporis callosi, commissura anterior and anterior crus fornicis). The secondary olfactory centers (gyrus hippocampi, cornu ammonis and gyrus dentatus and their fiber systems), the hypothalamus with its fiber systems, the commissura posterior, the psalterium,

the fimbria and the splenium corporis callosi were fully developed. Serial sections of the brain stem and the medulla revealed hypoplasia of the upper portion of the left oculomotor nucleus (for the levator palpebrae muscle), the roots of both trochlear nerves and the nuclei of the abducens and the facial nerve bilaterally. Only a trace of the nucleus of the accessory nerve, with a slender root, was present on the right side, whereas on the left neither the nucleus nor the root of the eleventh nerve was present. The hypoplastic nucleus of the hypoglossal nerve was represented by a single (unpaired) mass of cells situated in the median line of the medulla. The posterior longitudinal bundle was somewhat thin, but all other tracts, including the lemnisci, the pyramidal tracts, the pontile fibers and the bundle of Schultze, were normal. Biemond points out the significant coincidence of aplasia of the motor nerve nuclei, with agenesis of the primary rhinencephalic centers, and the development defect in the vascular system of the base of the brain. Because the olfactory nerves, the anterior portion of the corpus callosum, the fornix and the anterior commissure develop from the lamina terminalis, which, in turn, is formed by occlusion of the neuropore at the anterior end of the neural tube, one may regard arhinencephaly as a result of malocclusion of the neural tube in this place. Biemond is inclined to believe that the disturbing influence in the normal course of formative processes in the ventral and oral areas of the neural tube originates in the ventrally situated entodermal and mesodermal embryonal structures. He points out developmental defects of various entodermal and mesodermal organs repeatedly observed in cases of arhinencephaly (syndactyly and congenital defects of the heart and kidneys). In the case reported such a mesodermal defect was significantly represented by the anomaly of the arterial circle of Willis. Biemond concludes that the ventrally situated anlagen of the motor nuclei in the neural plate were affected directly by disturbances in the development of the mesoderm, whereas the olfactory nerves and the commissural systems were involved indirectly, as the result of an impediment in the process of occlusion of the oral end of the neural tube.

YAKOVLEV, Waltham, Mass. [ARCH. NEUROL. & PSYCHIAT.]

DISSEMINATED SCLEROSIS IN MOTHER AND CHILD. H. SMITH, Svenska läk.-tidning. **33**:1399 (Sept. 18) 1936.

Smith reports the case of a girl aged 14 who had disseminated sclerosis. The first symptoms, psychic lability and sense of weakness in the right leg, appeared a year previously. At the time of observation there were all the classic signs of sclerosis multiplex. The cerebrospinal fluid contained 34 mononuclear cells per cubic millimeter and an increased content of protein (Nonne-Apelt reaction positive). The mother of the girl had her first symptoms at the age of 20. She was 37 at the time of publication and in a terminal stage of the disease.

WALLGREN, Göteborg, Sweden.

INFLUENZAL MENINGITIS OF SEVEN MONTHS' DURATION. G. GEZELIUS, Svenska läk.-tidning. **33**:1436 (Sept. 25) 1936.

A boy aged 2 years fell acutely ill with symptoms and signs of meningitis. On bacteriologic examination the purulent spinal fluid displayed Pfeiffer's bacillus. The patient was treated with repeated lumbar punctures and with intramuscular injections and transfusions of blood. After six weeks the temperature curve fell and after that for a period of some months was normal except for high peaks every fourth or fifth day. The extirpated tonsils showed a chronic inflammatory process with the presence of Pfeiffer's bacillus. Before tonsillectomy the fluid constantly contained Pfeiffer's bacillus, but after the tonsillectomy it was found sterile. The boy's condition, however, gradually grew worse, and he died seven months after the onset of the disease, from acute internal hydrocephalus.

WALLGREN, Göteborg, Sweden.

JACKSON'S EPILEPSY IN AN INFANT WITH ANGIOMATOUS NEVI ON THE FACE. K. O. of KLERCKER, Svenska läk.-tidning. **33**:1513 (Oct. 16) 1936.

A boy aged 10 months had superficial angiomatous nevi on the face and on the right side of the front and on the vertex of the skull. Previously he had been healthy. On the day when he was first seen he had fever, displayed restlessness and had convulsions of the right side, with loss of consciousness. When examined, he showed right hemiplegia, bilateral edema and protrusion of the papillae. There were no changes in the cerebrospinal fluid and no roentgenologic changes in the skull. The Wassermann and the tuberculin test were negative.

WALLGREN, Göteborg, Sweden.

Psychology and Psychiatry

AGGRESSIVE-SUBMISSIVE BEHAVIOR AND THE FRÖHLICH SYNDROME. DAVID M. LEVY, Arch. Neurol. & Psychiat. **36**:991 (Nov.) 1936.

The author studied 33 cases of the Fröhlich syndrome. He concluded that the submissive behavior in the Fröhlich syndrome is due to a constitutional factor. It cannot be explained by early history, by a psychologic response to obesity or hypogenitalism or by the maternal attitude. Aggressive and submissive tendencies are presumably based on instinctive responses in social life. The strength of these responses is determined both by constitutional and by experiential factors.

BEVERLY, Chicago.

EMOTIONAL FACTORS IN MENTAL RETARDATION: A READING PROBLEM. RALPH C. HAMILL, Arch. Neurol. & Psychiat. **36**:1049 (Nov.) 1936.

This is a detailed description of the analysis of a boy who was left handed, had been forced to use his right hand and was having difficulty in learning to read. The analysis demonstrated that the failure in school was based on fear.

BEVERLY, Chicago.

A CHILDREN'S HOSPITAL FOR NEUROLOGIC AND BEHAVIOR DISORDERS. C. BRADLEY, J. A. M. A. **107**:650 (Aug. 29) 1936.

In spite of the greater interest in child neurology and behavior disorders there are few hospitals adequately equipped for the study and treatment of these conditions. The experiences encountered in a hospital for such disorders which has operated for five years are discussed. There is no evidence to support the idea that it is unwise to treat together in a single group children so afflicted. The practical convenience of treating together patients with similar needs for schooling, therapy and social development outweighs most of the objections. Since most of the children presented disorders of severe types the favorable therapeutic results obtained make the record of the hospital encouraging.

BONAR, Salt Lake City.

REACTIVE PSYCHOSIS IN RESPONSE TO MENTAL DISEASE IN THE FAMILY. LAURETTA BENDER, J. Nerv. & Ment. Dis. **83**:143 (Feb.) 1936.

The concept of the reactive psychogenic psychosis owes much in its development to the American school of psychiatry. Hoch argued against any sharp line dividing organic and psychic factors in the production of mental disease. Glueck and White emphasized a special category of reactive psychoses not conforming to the manic-depressive or the dementia praecox group and related to strong emotional experience. Bender reports case histories in eleven family groups in which psychosis developed in one member probably because of a psychosis in another. Cases of this sort are differentiated from those of folie à deux by the fact that there is no imitation of the first psychosis in the latter condition and that the identification processes in reaction psychosis are not intellectual, as in folie à

deux, but emotional and determined specifically by the family relationship. In three of the cases reported there was a brother-sister group, in three, a sister-sister group; in three, a mother-daughter group, and in two, a mother-son group. There were no father-son groups in the study.

Constitutional similarities between members of the same family, only one of whom may show outspoken psychotic behaviorism, are often conspicuous. Brothers, sisters, mothers and fathers are often as suspicious, secretive and uncooperative as the patient suffering from evident paranoid disease. Psychic mechanisms of identification or aggressive feelings toward the patient or the "in-laws," with ideas of guilt, play a large part. Misunderstood sexual difficulties, problems of masturbation, disturbance in the security of the home and break-up of a personal relationship play an important rôle. The incest motive in these cases is not brought out clearly by the author. There are the prevalent feeling that the psychosis in one member of the family is an indication of weakness in the family stock and, consequently, the natural fear that the same fate may overcome others. Characteristic is the unwillingness to accept the situation. It is not to be expected that the reactive psychosis will take the same form as the constitutional psychosis that precipitated it. Schizophrenia in one member of the family does not necessarily precipitate schizophrenia in another member but leads more usually to some form of anxious depressive state. There may, however, be definite schizoid coloring in the reactive depression of such a person. This does not make the prognosis in the reactive psychosis more serious, even if the other member suffers from a deteriorating process. There is a tendency for imitative features, which are probably less due to constitutional similarities than to identification processes. One mother clings to her psychosis, while she remains more or less contentedly in the same hospital with her schizophrenic son. Recovery from the reactive psychosis is possible, even when the first member of the family does not recover from his or her psychosis. It is remarkable that in the group studied the reactive psychoses were in women, whereas the initial mental illness in the family was more or less equally divided between men and women. This would suggest that women are more closely tied up emotionally with the family relationship and are less well adjusted on a heterosexual basis. There were no instances of daughters reacting to a psychosis in the mother or the father. It is interesting that the reactive psychosis seems to occur in response to a mental breakdown in a member of the family who stands for a double function in the family. Thus, a sister reacted psychologically after a brother became mentally ill, when the father was dead and the brother had played the emotional rôle to the sister of both a brother and a father. In another case the sick sister came to represent the dead father, who was more beloved than the husband. In this case recovery came with a closer attachment to the husband. In another case the younger sister represented all the family and emotional ties of an older sister, who had no hopes of marriage. The threat of marriage of the younger sister and a toxic psychosis with threat of death precipitated a bewildered depression in the older sister. In all cases in which the mother reacted to mental disease in a child, whether a daughter or a son, the father of the child was dead. In the mother-daughter situation the mother appeared dissatisfied with her own life and had hoped her daughter would live a purer life. The mother-son relationship was simpler than the mother-daughter situation. The son came to stand for the dead father, even when the mother had married again.

In general the prognosis in the reactive psychosis is good and depends on two factors: (1) recovery from illness of the beloved relative, and (2) specific psychotherapy directed toward an understanding of the psychic mechanisms involved.

HART, Greenwich, Conn. [ARCH. NEUROL. & PSYCHIAT.]

PSYCHOLOGY OF SUB-NORMAL INDIVIDUALS. B. O. WHITTEN, J. South Carolina M. A. **32**:253 (Nov.) 1936.

The degree of intelligence is expressed quantitatively by the intelligence quotient. The problem of behavior, among both the subnormally and the normally

intelligent, is the major point under discussion; however, the author outlines the various types of mental disturbances and cites six cases of different types of behavior. There is a classification according to cause. In summary the author tells how and what the patients are taught. It is an article well worth twenty minutes' perusal.

WESTON JR., Columbia, S. C.

MENTAL-HYGIENE ASPECTS OF THE DAY NURSERY. ETHEL S. BEER, Ment. Hyg. **20**:41 (Jan.) 1936.

Many day-nurseries take care of children of working mothers only. These institutions are the only ones that can be relied on in an emergency to give adequate daytime care to otherwise neglected preschool children. In providing companionship with his contemporaries for the child, the day-nursery is preferable to a permanent institution, since it does not necessitate disruption of the family and removal of the child from his own home and provides an environment that is not entirely artificial. The day-nursery has unlimited opportunities to follow the child's growth and expansion; it can be of great benefit educationally and can help in the formation of desirable social and hygienic habits. It is frequently an agency for giving advice and assistance to families and securing for them the help of various organizations. It can also be of tremendous influence in the neighborhood.

Stressing the welfare of the children instead of relief for working mothers as the main purpose of day-nurseries will create higher standards. Good results require proper surroundings, with sufficient space, proper washing and toilet facilities and furnishings and playground equipment essential for a well regulated healthy daily program. Attention should be given to the general physical and mental condition of the children, but experimentation should be excluded; discipline and group organization should not suppress children or prevent their being happy.

The great responsibility of training children in these formative years necessitates emphasis on the quality rather than on the quantity of the work accomplished. Beer suggests training a small number as thoroughly as possible by maintaining high standards for the plant and personnel.

DAVIDSON, Newark, N. J. [ARCH. NEUROL. & PSYCHIAT.]

THE UTILIZATION OF PLAY IN THE CONSTRUCTION OF HEALTHY MENTAL ATTITUDES. JOHN EISELE DAVIS, Ment. Hyg. **20**:49 (Jan.) 1936.

Normal children often have unhappy play experiences, becoming resentful and discouraged in losing or unduly elated in winning; they are irritated by disappointing toys and restrictive rules. This may be likened to the disastrous effects of false ideals and ideas of play in the formative period of the lives of the mentally ill. Ideally, emphasis must be placed on striving together toward a reward more satisfying than the egotistic compensation of the lone winner to the exclusion of other players. An experimental survey, in which discussion of the situations involving personality played a large rôle, revealed that boys were interested in talking about something that they had done; discussion of the game convinced them of the value of such qualities as humility, good sportsmanship, honesty and friendliness, as well as of the qualities of physical strength and skill. Scrutiny of individual play enabled each one to feel that he had accomplished something worth while.

Davis believes that, in conducting a program of physical education for the mentally ill, more healthful mental attitudes can be fostered and that more wholesome satisfactions can replace the selfish aggrandizement of a lone person by emphasizing through these informal discussions the richly significant relations of the physical acts to wider social practices. Practicable applications of the modifiable play experience to the higher moral and social values and appreciations may possibly offer important educational opportunities in the future.

DAVIDSON, Newark, N. J. [ARCH. NEUROL. & PSYCHIAT.]

ETIOLOGIC CONSIDERATIONS OF CERTAIN NEUROPSYCHIC DISORDERS OF CHILDHOOD. A. GAREISO and F. ESCARDÓ, Arch. de méd. d. enf. **39**:505 (Aug.) 1936.

Gareiso and Escardó report from the Children's Hospital at Buenos Aires the results of thirty years' clinical experience in the neurologic disorders of childhood, during which 25,000 patients were examined. The histories of 1,347 of the cases have been reviewed, and the various disorders represented therein have been classified. These are distributed as follows: epilepsy, 560 cases; oligophrenia, 439 cases; encephalopathy, 181 cases. In the latter group, 72 patients showed a psychic and motor syndrome without epilepsy, while 48 had frank manifestations of epilepsy. There were 61 patients with Vogt's syndrome, 86 with Little's disease, and 81 with spasmodic hemiplegia.

Among the sources of epilepsy, syphilis ranks first, with 39 per cent, or 202, of the cases of epilepsy showing definite evidence of this infection. Syphilis was responsible also for 45 per cent of the cases of oligophrenia, 52 per cent of the cases of encephalopathy, 40 per cent of the cases of spastic hemiplegia and 23 per cent of the cases of Little's disease.

Next to syphilis as an etioloogic factor, obstetric trauma appears in every category, varying in frequency from 15 to 50 per cent, the latter proportion appearing, as might be assumed in advance, in the cases of Little's disease.

The organization of the clinic for the prophylaxis and treatment of these diseases is outlined in great detail.

AMESSE, Denver.

SOME CASES OF THYMOGENIC MUTISM IN EARLY CHILDHOOD AND THEIR TREATMENT. J. WATERINK and R. VEDDER, Ztschr. f. Kinderpsychiat. **3**:101 (Nov.) 1936.

The author presents a detailed discussion of mutism in general. Classified as thymogenic is mutism which develops in consequence of a sudden affective storm, notably, sudden fright that almost instantly robs the child of his power of speech.

Three cases are cited in which the treatment consisted of gradual dissipation of fear of the offending object. A 3 year old boy whose mutism was traced to the sudden exposure to a grotesque object (a mask) was cured by a conditioning process, the original grotesqueness being approached gradually by a series of funny drawings, until the child realized that the object was harmless. A 2½ year old girl became mute when frightened by the low flight and noise of an airplane. Gradual conditioning to the appearance and the sound of airplanes restored her speech. A 4½ year old boy was frightened by the explosion of a cannon during military maneuvers in the vicinity. Gradual acquaintance with soldiers, and with rifles and other military paraphernalia brought about a cure. The observation is made that in each of these cases there existed a family history of nervous trouble in some degree.

(The original paper is written in French.)

JAHR, Omaha.

Diseases of the Genito-Urinary Tract

IMPORTANCE OF BACTERIOLOGIC CULTURES FOR THE DIAGNOSIS OF GONOCOCCAL VULVOVAGINITIS AND PROCTITIS IN CHILDREN. ALFRED COHN, Am. J. Syph., Gonor. & Ven. Dis. **20**:623 (Nov.) 1936.

Attention is called to the importance of differentiating gonorrheal infections in children from other inflammatory infections of the genital organs or the rectum. In the author's experience bacteriologic culture is the most important means of differentiation. He outlines the methods of culture, as well as his methods of staining, some of which are classic and some modifications of the standard methods of staining blood cultures. Stress is laid on the difficulty of examination by the smear method, as well as that of differentiating the various organisms.

Results are given in the summary: "This paper contains reports of bacteriologic cultures in cases of vulvovaginitis and asymptomatic rectal inflammation in

children. A new modification of Levinthal's blood-extract agar and a simplified technic for testing fermentation reactions of gram-negative diplococci are described. The results obtained by the application of these methods indicated clearly that reliable etiologic diagnosis can be made only by means of bacteriologic cultures, and evidence is presented which warrants the conclusion that cultures for gonococci should be made routinely in cases of vulvovaginitis and proctitis in children."

ROYSTER, University. Va.

URETEROPELVIC (RENAL) OBSTRUCTION IN THE YOUNG. E. R. HALL, Canad. M. A. J. **35**:140 (Aug.) 1936.

Renal obstruction at the ureteropelvic junction occurs in childhood more often than is fully recognized. The block at the point of obstruction is of varying degree and probably never becomes complete, except temporarily, until complications arise, such as infection, formation of a stone or other process brought on by the passage of time.

Most significant in the diagnosis are a history of recurrent pain in the urinary tract, often enlargement of the kidney as noted by palpation, and pyelograms showing obstruction.

The most common causes of obstruction are (1) aberrant, accessory or anomalous vessels, (2) abnormalities in position, (3) a high or oblique entrance of the ureter into the renal pelvis and (4) congenital hypertrophy of the circular layer of smooth muscle at the ureteropelvic junction.

MOORE, Omaha.

RATE OF EXCRETION AND BACTERICIDAL POWER OF MANDELIC ACID IN THE URINE. H. F. HELMHOLZ and A. E. OSTERBERG, J. A. M. A. **107**:1794 (Nov. 28) 1936.

By oral administration of sodium mandelate concentrations of mandelic acid varying from 0.25 to 1 per cent can be obtained in the urine. Such concentrations will act bactericidally on most organisms at a p_H ranging from 5 to 5.7. Certain strains of Aerobacter and Pseudomonas are far more difficult to kill than is Escherichia coli.

BONAR, Salt Lake City.

MANDELIC ACID IN THE TREATMENT OF INFECTIONS OF THE URINARY TRACT. E. N. COOK and H. A. BUCHTEL, J. A. M. A. **107**:1799 (Nov. 28) 1936.

Therapy with mandelic acid seems relatively simple but actually is not, for unless the p_H of the urine is checked daily, the results will be disappointing. Sometimes hydrochloric acid orally or an acid-ash or ketogenic diet is necessary. At the present time bacillary infections are attacked by this form of therapy but coccic infections are not.

BONAR, Salt Lake City.

EXPERIENCES WITH AMMONIUM MANDELATE IN URINARY INFECTIONS. L. P. DOLAN, J. A. M. A. **107**:1800 (Nov. 28) 1936.

The author used a 40 per cent solution of ammonium mandelate in the treatment of infections of the urinary tract. In seven cases of infection with Bacillus coli this treatment resulted in six apparent cures and one partial cure. Treatment in three cases of staphylococcic infection resulted in three failures. Hematuria was encountered several times. Because of the increased general use of this drug, attention should be called to this complication.

BONAR, Salt Lake City.

COMMON UROLOGICAL CONDITIONS IN CHILDREN. M. F. CAMPBELL, M. Clin. North America **20**:1027 (Nov.) 1936.

About one half of all children suffer from some urologic disturbance at some time before puberty. Many of these disturbances are minor and very frequently

are not recognized. On the other hand, many important conditions are overlooked through failure to make simple routine examinations of the urine of all sick children.

The most common symptoms met with in children having urologic lesions are pyuria, disturbances of urination, and nephritis. Acute pyuria or acute pyelonephritis is easily recognized and usually responds promptly to simple treatment. Recurrent attacks frequently accompany focal infection elsewhere. If the condition resists intensive medical therapy for from two to four weeks, a complete urologic examination is indicated. Methenamine U. S. P. appears to be the best available urinary antiseptic, but it should be given in large doses, from 10 to 12½ grains (0.64 to 0.81 Gm.) per year of age. The urine should be kept as near p_H 5.5 as possible by the use of ammonium nitrate or calcium chloride. If this intensive therapy fails, the whole urinary tract should be examined. Obstruction is found to be the most common predisposing cause of infection. Congenital stricture of the ureter is the most common abnormality of the upper part of the urinary tract, but the obstruction may occur at any point from the preputial orifice to the renal calyx. Aberrant renal vessels are a frequent cause of obstruction. About one fourth of all kidneys have some anomalous vessels.

Enuresis is the commonest disturbance of urination found in children and is probably a purely functional disorder in 95 per cent of those who suffer from it. When the disorder is resistant to treatment the patient should have a urologic examination. In 532 children subjected to cystoscopic examination, Campbell found uropathy adequate to explain the condition in 60 per cent, 15 per cent of whom had residual urine.

Hematuria in childhood usually indicates nephritis, renal tumor or renal tuberculosis.

Embryonal adenomyosarcoma (Wilms) is the commonest abdominal tumor found in children. Hydronephrosis is the commonest palpable renal tumor in children and is usually due to congenital stricture at the ureteropelvic junction or to vascular obstruction by anomalous vessels at the lower pole of the kidney.

EUGENE SMITH, Ogden, Utah.

IONIZED BLOOD CALCIUM IN PATIENTS WITH RENAL CALCULI. H. POLLACK and MIRIAM REINER, Proc. Soc. Exper. Biol. & Med. **33**:432 (Dec.) 1935.

There is no evidence of an increase in the concentration of calcium ions in any of the twenty-four patients with renal calculi. HANSEN, Minneapolis.

COMPLEMENT TITRE IN ACUTE NEPHRITIS. C. E. KELLETT, Lancet **2**:1262 (Nov. 28) 1936.

In three cases of acute glomerulonephritis the complement content of the blood was found to be much lower than normal, but it gradually returned to normal with recovery. No such drop was noticed in any case of chronic nephritis, even in those in which there were much albuminuria and an increased amount of urea in the blood. Reasons are advanced in support of the suggestion that the underlying mechanism of acute glomerulonephritis is one of reversed anaphylaxis.

LANGMANN, New York.

BILATERAL DILATED URETERS. M. R. PRICE, Proc. Roy. Soc. Med. **29**:1213 (Aug.) 1936.

A case of bilateral dilated ureter in a boy of 2 years, an only child, is reported. The mother said the child had always had weak kidneys.

One Dec. 29, 1935, the child was admitted to the hospital on account of frequency of micturition and dysuria. The urine contained much pus. On Jan. 1, 1936, acute retention developed, requiring catheterization for relief. This treatment was continued for nine days, after which an emergency suprapubic cystostomy was performed, as it was found impossible to pass a catheter.

Eight days later 7 cc. of neo-iopax was given intravenously. No secretion was shown by the roentgen rays after two hours. The child became very ill and toxic for ten days. Gradually improvement took place. Two months later retrograde pyelography showed dilated tortuous ureters; the left renal pelvis was seen to be hydronephrotic; the right was not demonstrated. No urethral obstruction, no stenosis and no valve could be found.

WILLIAMSON, New Orleans.

PERINEAL ECTOPIA OF THE TESTICLE. VICTOR COHEN, Bull. Soc. de pédiat. de Paris **33**:385 (May) 1935.

A boy, when first seen at the age of 9 years because of obesity, was found to have a testicle in the right part of the perineum; the left testicle was in the normal position in the scrotum. Operation was performed, and the aberrant gland was placed in the right half of the scrotal sac. The boy soon grew taller, and the obesity improved. Three years later he again became very obese. Intramuscular injections of thymic extract were used, as well as oral administration of thyroid extract, and soon after the commencement of this treatment secondary sexual characters appeared, and normal development ensued. This type of obesity is of endocrine origin, as differentiated from other forms, such as that seen in dystrophia adiposogenitalis, which is thought to be neurogenic.

BENJAMIN, Montreal, Canada.

VESICAL EXSTROPHY TREATED BY PRERECTAL PELVIC TRANSPOSITION OF THE BLADDER. HENRI GODARD, Bull. Soc. de pédiat. de Paris **33**:408 (June) 1935.

A boy, 5 years old, with exstrophy of the bladder was operated on in two stages. First, the bladder was tucked under the pubes, and then its neck was inserted within the anal sphincter. Later, the epispadias which was present was closed, leaving the genital system above the pubes. Retrograde pyelography showed the calices, pelves and ureters to be dilated; this was somewhat less marked after operation. The pubic bones were widely separated at the symphysis. The maximum capacity of the bladder was 125 cc. During the night he was continent; during the day he had to void every one or two hours. The various types of operation for this congenital malformation are discussed.

BENJAMIN, Montreal, Canada.

CLINICAL SIGNIFICANCE OF THE SIX MOST IMPORTANT MALFORMATIONS OF THE KIDNEYS AND URETERS. H. E. BÜTTNER, Ergebn. d. inn. Med. u. Kinderh. **50**:203, 1936.

1. Polycystic kidney is a congenital malformation. It behooves one to speak separately of polycystic kidney as a malformation and as a disease. There is no fundamental difference between polycystic kidney of the new-born and that of the adult. The disease picture is so sharply demarcated that it cannot be confused with that of any other cystic disease of the kidney.

2. Renal displacement (dystopia) is a congenital malformation which is to be differentiated from movable kidney. Failure to recognize dystopia has led to unnecessary operations, especially appendectomies.

3. Double ureter leads quite often to urinary disease.

4. Ureterocele is not a rare anomaly, and it is the cause of protracted catarrhal disease. Its presence should always make one suspect that other renal and ureteral anomalies are present.

5. Renal and ureteral malformations may be multiple.

6. In order to avoid as much as possible errors in the diagnosis of anomalies of the kidneys, ureters and bladder, it is advisable to resort to cystoscopy and pyelography in the face of any obscure abdominal complaint. The proportion of anomalies found in the urologic domain and confirmed by operations increases with the frequency with which one resorts to cystoscopy in the various disturbances.

CAPPER, Philadelphia.

USE OF A DERIVATIVE OF SULFANILAMIDE IN THE TREATMENT OF PYELITIS IN CHILDREN. WOLFGANG PERNICE, Kinderärztl. Praxis **7**:304 (July) 1936.

Eighteen patients with pyelitis were treated with a derivative of sulfanilamide, the hydrochloride of 4'-sulfamido-2,4-diamino-azobenzene.

Infants were given 0.1 Gm., young children 0.15 Gm. three times daily and older children 0.3 Gm. twice daily, by mouth.

Cure was effected after from four to eleven days of treatment. To prevent relapses, the drug must be given for eight days after the urine has become normal.

The author publishes his report from the clinic of Professor Freudenberg in Marburg, Germany, and expresses the belief that this treatment is superior to any other.

HEYMANN, Cleveland.

ALBUMINURIA IN CHILDHOOD. KARL DIETL, Wien. klin. Wchnschr. **48**:1567 (Dec. 20) 1935.

Dietl points out that it has been known for a long time that albuminuria in childhood is often functional; in fact, in this period the functional type of albuminuria is more common than the organic type. Functional albuminuria may occur in either chronic or intermittent form. The latter type has been called orthostatic albuminuria, but its cause has not yet been fully explained. The designation orthostatic indicates that it occurs when the patient is in a standing position. The fact that it occurs when the patient is in an upright position led to the suspicion that it is caused by a reflex nervous reaction.

With all due respect to lordosis as a cause of orthostatic albuminuria, Dietl believes, together with Hamburger and Noeggerath, that a lumborenal reflex is partly responsible. If this assumption is correct, then the excitation of such a reflex without lordosis should cause the excretion of albumin. Dietl produced stimulation by cold in the lumbar region by means of ethyl chloride, with the child lying on his side and the spine bent to a kyphotic position. The cooling was brought about gradually, so that no defensive lordosis would be produced. Before each experiment Dietl made sure that the urine was free from albumin, and after the experiment the child urinated while retaining his position, that is, lying on the side. Eighteen children were thus examined. Four showed spontaneous orthostatic albuminuria after the experiment, and fourteen excreted albumin after the production of a slight artificial lordosis. In these fourteen children cold alone could not produce the albuminuria. It is noteworthy that the reflex production of albuminuria was successful only in those children who already had spontaneous orthostatic albuminuria. This circumstance leads one to suspect that patients with this condition have an increased disposition to albuminuria, which is affected by comparatively slight stimuli. The purely mechanical explanation of the disease on the basis of lordosis does not seem to be adequate, and reflex actions must be considered.

ABT, Chicago.

THE UREA CLEARANCE TEST OF VAN SLYKE IN CHILDREN. H. J. VAN DER MOLEN, Maandschr. v. kindergeneesk. **5**:467 (Aug.) 1936.

From a study of twenty children the author concludes that in children van Slyke's urea clearance test is not preferable to the other tests of renal function usually employed.

VAN CREVELD, Amsterdam, Netherlands.

Diseases of the Ductless Glands; Endocrinology

THE EFFECT OF INTERRUPTION OF THE SUPRAOPTICO-HYPOPHYSEAL TRACTS ON THE ANTIDIURETIC, PRESSOR AND OXYTOCIC ACTIVITY OF THE POSTERIOR LOBE OF THE HYPOPHYSIS. C. FISHER and W. R. INGRAM, Endocrinology **20**:762 (Nov.) 1936.

It has been shown that, when the supra-optico-hypophysial tracts are interrupted bilaterally in the cat and the monkey by appropriate lesions in the anterior

part of the hypothalamus, diabetes insipidus develops, always in association with marked degenerative changes in the pars nervosa and atrophy of the supra-optic nuclei. This suggests that diabetes insipidus is the result of diminution in, or abolition of, the secretion of the antidiuretic principle by the posterior lobe of the pituitary body. This is further borne out by the finding that the polyuria in this disease is primary to the polydipsia.

To add further evidence, the authors made assays of the atrophic posterior lobes of 4 cats suffering from diabetes insipidus and the glands of 3 normal cats. The atrophic glands were practically free from antidiuretic, pressor and oxytocic activity, which proves that the antidiuretic principle is deficient in diabetes insipidus and that the elaboration of this component, as well as of the pressor and the oxytocic component, is under the control of the supra-optico-hypophysial system.

JACOBSEN, Buffalo.

TREATMENT OF SEXUAL UNDERDEVELOPMENT IN THE HUMAN MALE WITH THE ANTERIOR-PITUITARY-LIKE HORMONE (A. P. L.) OF PREGNANCY URINE. D. L. SEXTON, Endocrinology **20**:781 (Nov.) 1936.

Eighteen boys in whom the testes were not definable in the scrotum were treated with the anterior pituitary-like gonadotropic substances from the urine of pregnant women. Three had been previously operated on for hernia, and in those operative complications precluded any result from treatment with the gonadotropic substance. Of the remaining 15 (20 instances), complete descent occurred in 10 (15 instances) and incomplete descent (intermittent retraction into canals) in 2.

It is suggested that in instances in which testicular tissue is not definable in any part of the genital tract true cryptorchidism does not necessarily exist. Instead, there may be rudimentary testicular tissue which cannot be differentiated from other soft tissue. On the average, treatment totaling 4,800 rat units over a period of eight weeks should suffice to determine whether or not results are to be expected.

Those boys with obesity of the pituitary type responded more favorably than those who showed eunuchoid characteristics. Treatment of subnormal genital development was less effective than treatment of nondescent.

Clinical evidence is offered to show that delayed descent results in abnormal physical proportions, with excessively long bones being the predominating manifestation.

Surgical intervention is recommended in all cases in which the condition is complicated by hernia and in those in which treatment with the gonadotropic substance fails.

JACOBSEN, Buffalo.

SUBCLINICAL HYPOTHYROIDISM IN CHILDREN. M. MOLITCH and S. POLIAKOFF, Endocrinology **20**:816 (Nov.) 1936.

The inmates of the New Jersey State Home for Boys were studied, in order that the incidence of mild hypothyroidism might be determined. The boys ranged from 8 to 17 years of age, the majority being about 14 years old.

Determinations were made of osseous age, the cholesterol content of the blood, basal metabolism, intelligence, scholastic achievement, behavior and physical condition. Anthropometric data were compared with the normal limits given by Engelbach. The conclusion was that osseous retardation is the most consistent finding in hypothyroidism in children. Determinations of the basal metabolism and of the cholesterol content of the serum are of little aid in diagnosing the condition in children because of variability and lack of a consistent relationship to the clinical picture. In the clinical picture only dryness of the skin and brittleness of the hair were consistently found. A history of overweight at birth and of delay in development in such matters as teething, walking and talking is of corroborative significance. The intelligence is not a reliable criterion, and the behavior may be either hypo-active or hyperactive.

Subclinical types of hypothyroidism may be recognized by the osseous retardation, as revealed by roentgen examination, and by the favorable reaction of the patient to replacement therapy with thyroid.

JACOBSEN, Buffalo.

THE TREATMENT OF PITUITARY INFANTILISM WITH ANTERIOR PITUITARY EXTRACT. M. M. GOLDBERG, Endocrinology **20**:854 (Nov.) 1936.

The author reports the case of a youth aged 18½ whose mother stated that he had not grown since he was 10 years old. He complained of weakness and lack of energy. His voice had not changed. Physical examination revealed small stature, the facial appearance of an old man (progeria), girlish voice, lack of axillary and pubic hair and poor development of the genitalia. Roentgen examination showed open epiphyses.

Coincident with the administration of 37.5 cc. of anterior pituitary extract (Squibb) over a period of approximately four and one-half months, he gained 2 inches (5 cm.) in height and exhibited definite stimulation of the primary and the secondary sexual characteristics.

JACOBSEN, Buffalo.

THE RELATION OF SERUM PHOSPHATES TO PARATHYROID TETANY. J. H. JONES, J. Biol. Chem. **115**:371, 1936.

Jones has shown that the addition of a 4 per cent solution of basic aluminum acetate to diets low in calcium protected rats from the symptoms which usually follow removal of the parathyroid glands. The calcium of the serum remained high and the phosphorus low. This was found to be the case with a diet which did not contain over 0.005 per cent of calcium. If, for any reason, the animals did not eat after the loss of parathyroid function, the phosphorus of the serum increased; the calcium fell, and tetany followed. Apparently, if the phosphorus of the blood can be kept low, the calcium remains above the level of tetany, even though there is a pronounced deficiency of calcium in the diet. If, however, there is a source of available phosphorus, either from the diet or from excessive endogenous metabolism resulting from fasting, the phosphorus of the blood rises; the calcium falls, and tetany appears.

PAGE, New York. [ARCH. NEUROL. & PSYCHIAT.]

PSYCHIATRIC ASPECTS OF MYXEDEMA. ANDREW J. E. AKELAITIS, J. Nerv. & Ment. Dis. **83**:22 (Jan.) 1936.

Diminution in the functional performance of the entire organism results from insufficiency of the thyroid gland, with diminution of excitability of the vegetative nervous system and psychic retardation. Myxedematous swelling of the skin, an expressionless, swollen face and general stupidity of appearance are characteristic. Speech is monosyllabic. There is loss of initiative, so that the patient sits immobile for hours at a time. Fatigue and ready exhaustibility after slight exertion are common. Patients are likely to become depressed and irritable. Orientation and memory for remote events are usually not impaired. Headaches in the frontal and occipital regions occur. The patients may pass into stupor, which may last for months.

It is important to differentiate between a coincidental psychosis occurring during myxedema and a mental disturbance arising during myxedema and dependent on it. The differentiating test is apparently the response to the administration of thyroid extract, which, if given to a patient with independent psychosis, will not cause improvement. Wagner von Jauregg concluded that 15 per cent of patients with myxedema are psychotic. The psychosis usually arises when the myxedema is advanced. Patients described by Kraepelin, Pilcz and Wegener showed repression, ideas of persecution, nihilism, hallucinations, clouding of consciousness and a peculiar form of affective disturbance which Wegener designated

as resigned anxiety. Akelaitis considers most cases reported in the literature to be of the delirious-hallucinatory reaction type; he describes two cases, both of women, aged 58 and 41 years, respectively, in which such a mental picture was shown. Both patients showed increase in dextrose tolerance, puffiness of the skin, loss of hair and a markedly diminished basal metabolic rate. There is described the case of another woman aged 52, who was in a myxedematous stupor, and a fourth case of an unmarried woman aged 66, in whom myxedema developed spontaneously in 1931; a year later the latter complained of depression and fatigue. After vigorous thyroid medication she became confused and more deeply depressed, later becoming clear and rapidly more cheerful.

HART, Greenwich, Conn. [ARCH. NEUROL. & PSYCHIAT.]

PHYSICAL METHODS OF ENDOCRINOTHERAPY. A. P. CAWADIAS, Brit. M. J. **2**:215 (Aug. 1) 1936.

The article does not lend itself to abstracting. General conclusions which are suggestive of the article follow.

"Physical methods influence endocrine functions, and the action of most physical methods can be explained by this mechanism.

"This leads to a more general conclusion. There is a tendency among students of physical medicine to consider this branch of healing as a separate art. In my opinion it constitutes simply a development and an enrichment of internal medicine or of surgery, and can be separated from neither one nor the other. From the point of view of internal medicine we see that the mechanism of action of physical agents is similar to that of psychotherapy, dietetics, and pharmacotherapy. Thus the clinical application of physical agents follows the same lines as the other procedures of internal medicine, the law of diagnosis and the law of combination.

"My object has been to systematize the factors pointing to the necessity of physical medicine thinking in terms of endocrinology, and of endocrinology thinking in terms of physical medicine."

ROYSTER, University, Va.

DIABETES MELLITUS IN CHILDHOOD. WILFRID W. PAYNE, Brit. M. J. **2**:960 (Nov. 14) 1936.

This paper is a summary of the ultimate experiences with diabetes mellitus during the last ten years at the Hospital for Sick Children. The details of diagnosis in typical and atypical cases are briefly outlined. In the discussion of diet the author expresses the thought that the aim of treatment is twofold: first, to enable the child to be happy, active and healthy, and, second, to prevent the progress of the disease. He feels that the first is relatively simple, but the second, difficult and often impossible. This method of handling the condition from a dietary standpoint is outlined, including caloric intake as well as the ratio of carbohydrate to fat. Under the heading "Insulin Treatment" he emphasizes the desirability of giving insulin in sufficient amounts to remove all symptoms of the disease. It has been stated that it is not necessary to do more than this, but the author feels that if the amount of sugar in the blood is consistently high, even in cases in which no symptoms are present, the disease increases in severity at a greater rate than in cases in which a more or less successful attempt has been made to keep the sugar content of the blood within the normal range. In children, particularly, there is a great degree of instability of the blood sugar, even under treatment by insulin. The relation of administration of insulin to the ingestion of food is briefly discussed. Care at home is next discussed, and the author feels that therein is the supreme test of the success of such treatment. Almost all children can be controlled in hospitals, but when they go home they slip back. The author feels that the hypoglycemic symptoms vary more widely in children than in adults. In addition to the classic symptoms of hunger, shakiness and hot and cold sweats, with subsequent drowsness and coma, children may show fretfulness, tearfulness or bad temper. Abdominal symptoms which are

well known are not infrequently noted in children. Occasionally there are no warning symptoms, and the child abruptly loses consciousness. Sugar by mouth suffices. If unconsciousness persists for any length of time, epinephrine, solution of posterior pituitary or, occasionally, a solution of dextrose intravenously may be administered. Certain complications of diabetes in children are outlined, such as periodic attacks of nausea and vomiting, with or without abdominal pain. These are usually hypoglycemic. Occasionally ketosis occurs, especially in cases in which there is an outpouring of epinephrine. This may bring about a typical attack of diabetic coma. Fatigue and excitement, as well as a focus of infection, may produce this. If treated at once, even at home, the condition can be controlled. Treatment consists in giving sugar by mouth and sufficient insulin to keep the urine free from sugar. Sodium bicarbonate and a little infusion of gentian will control the nausea. In some diabetic children marked symptoms develop whenever a parenteral infection occurs. These must be treated along lines previously outlined.

ROYSTER, University, Va.

ON HYPOPITUITARISM. WALTER LANGDON-BROWN, Brit. M. J. **2**:984 (Nov. 14) 1936.

This is one of a series of papers on endocrinology. A brief outline is given of various conditions in which hypopituitarism is thought or known to be the etiologic factor. Included in this group are Fröhlich's syndrome, Dercum's disease, pituitary obesity, dwarfism and infantilism, Simmonds' disease and other supposedly hypopituitary syndromes. A brief outline of the treatment of pituitary obesity is included.

ROYSTER, University, Va.

GENERAL PATHOLOGIC ANATOMY OF THE ENDOCRINE SYSTEMS OF THE FETUS AND OF THE NEW-BORN WITH SHORT NOTES ON FETAL ENDOCRINOLOGY. P. REDAELLI, Lattante **7**:271 (June) 1936.

This is a lecture given before the fourth Italian Congress of Nepiology, at Trieste. In the transition from the fetal stage to that of infancy, during the first six months of life, an endocrine change is noted which is characterized by hyperthymism and hyperinsulinism. Considerable information regarding the endocrinology of the fetus is gathered from pathologic effects of syphilitic infections.

HIGGINS, Boston.

SPONTANEOUS REMISSION IN CONGENITAL HYPOTHYROIDISM. J. SIEGL, Arch. f. Kinderh. **108**:199 (Aug. 4) 1936.

A case is reported.

CRANE, Chicago.

DEVELOPMENT OF SPEECH IN AN OLIGOPHRENIC CHILD. THEODORE HELLER, Ztschr. f. Kinderpsychiat. **3**:112 (Nov.) 1936.

The author describes a monozygotic twin who presented various difficulties from the time of birth. His twin brother, born first, developed normally. At the age of 16 months he began to walk, but his gait remained unsteady for a long time. He was adept at crawling and preferred this means of locomotion to the normal form. When he was 4 years of age, a diagnosis of idiocy was made, and the boy was placed in an institution. He did not talk and had no comprehension of language. His general behavior was that of an erethitic child.

Training in language began immediately after admission. The boy soon learned the use of words and acquired some comprehension of their meaning. His general behavior improved constantly with advance in the use of words and phrases. Though he remains an idiot, he has been trained to make his wants known.

JAHR, Omaha.

Diseases of the Muscles, Bones, Joints and Lymph Glands

PRIMARY MYOPATHIES: REPORT OF THIRTY-SIX CASES AND REVIEW OF THE LITERATURE. SAMUEL HURWITZ, Arch. Neurol. & Psychiat. **36**:1294 (Dec.) 1936.

In this article the findings in thirty-six cases of primary myopathy are summarized, and the literature and the various forms of treatment are briefly reviewed. No striking improvement was noted after the use of amino-acetic acid, but the author advises continuation of the therapy because of the subjective improvement promoted and the possibility that the progress of the disease may be slowed or arrested.

BEVERLY, Chicago.

METALLOTHERAPY IN THE CONSERVATIVE TREATMENT OF CHRONIC OSTEOMYELITIS. JACOB E. KLEIN, Arch. Pediat. **53**:476 (July) 1936.

Powdered tin and tin oxide were used in thirteen cases of chronic osteomyelitis, with clinical cures in eleven, marked improvement in one and slight improvement in the other. Nine of the persons treated were adults, and four were children. The duration of treatment varied with the extent of infection of the bone and the response of the patient. One patient responded to treatment in two weeks, and another in six months, and still another was making favorable progress after two years. Surgical treatment is also indicated in most cases.

The principle involved is a nonspecific stimulation of the patient's immunity, with care to prevent a depression of immunity by overstimulation.

The treatment is simple and requires no hospitalization.

ORR, Buffalo.

GROWTH: OSSIFICATION OF THE BONE CENTERS OF THE HAND AS CORRELATED WITH GENERAL GROWTH STAGES. C. C. HOWARD, Internat. J. Orthodontia **22**: 888 (Sept.) 1936.

The first cycle of growth begins with fertilization and ends about the first year of postnatal life. The second attains its peak about the sixth or seventh year, and the third is the adolescent spurt. The ossification of bones of the hand as an aid in interpreting variations in growth is discussed.

LEWIS, Dayton, Ohio. [ANGLE ORTHODONTIST]

THE OPERATIVE VERSUS THE MANIPULATIVE TREATMENT OF SLIPPED FEMORAL EPIPHYSIS. S. KLEINBERG and J. BUCHMAN, J. A. M. A. **107**:1545 (Nov. 7) 1936.

The treatment of slipped epiphysis, which has been called epiphysiolysis, epiphysial fracture of the hip joint, epiphysial coxa vara or osteochondritis of the neck of the femur, is still perplexing and in a state of flux because of the poor results obtained. Successful treatment must include correction of the deformity with the least amount of trauma possible and reestablishment of the circulation across the epiphysial area, in order to produce early fusion between the head and the neck of the femur. This is best accomplished by operative resection of the epiphysial plate, realinement and placing in intimate contact the cancellous bones of the head and the neck of the femur. The technic is described. The postoperative treatment consists of four weeks of immobilization in a plaster of paris spica, followed by several weeks in a suspension apparatus to allow immobilization of the hip. This treatment ordinarily takes about eight months, after which restrictions are discontinued.

BONAR, Salt Lake City.

PROGRESSIVE MUSCULAR DYSTROPHY. WILLIAM J. JOHNSON, M. Rec. **144**:506 (Dec. 2) 1936.

Progressive muscular dystrophy has been defined as a progressive atrophy of the muscles with no discoverable lesion of the spinal cord. The author enumerates

and describes the five recognized types, which are: (1) the Duchenne-Aran pseudohypertrophic type, which is the most common; (2) the pseudohypertrophic type, involving the thoracic girdle, which is less common; (3) the Leyden-Moebius type; (4) the fascioscapulohumeral type of Landouzy and Dejerine, and (5) the juvenile form of Erb. These groups are not always entirely distinct.

Two cases in brothers are described. Two other brothers in the family were normal. Both patients died suddenly, and autopsy revealed that the contributory cause of both boys' death was edema of the larynx (status lymphaticus).

Full reports of the autopsies of both patients are given in the article.

WILLIAMSON, New Orleans.

REDUCED ASCORBIC ACID CONTENT OF BLOOD PLASMA IN RHEUMATOID ARTHRITIS. J. F. RINEHART, L. D. GREENBERG and F. BAKER, Proc. Soc. Exper. Biol. & Med. **35**:347 (Nov.) 1936.

The level of cevitamic acid in the plasma was determined in 36 cases of rheumatoid arthritis. In 12 cases in which the intake of vitamin C had been high, the values for cevitamic acid in the plasma were essentially in the same range as those for normal subjects. In 21 cases in which the intake of vitamin C had not been high, the values were definitely low. Periodic examinations of the blood plasma in 4 cases in which vitamin C had been administered disclosed refractory responses in 2. These studies indicate that in some cases the intake required to maintain an adequate level of vitamin C in the plasma is much above that required by a normal person. The mechanism involved is unexplained.

HANSEN, Minneapolis.

OSTEOCHONDRITIS DEFORMANS COXAE JUVENILIS OR PERTHES' DISEASE: THE RESULTS OF TREATMENT BY TRACTION IN RECUMBENCY. ARTHUR L. EYRE-BROOK, Brit. J. Surg. **24**:166 (July) 1936.

Eyre-Brook describes fully the clinical course and treatment of Perthes' disease. At present the etiologic factor is not known, but theories have been advanced regarding its origin. These theories include traumatic, infective and constitutional disease of bone and abnormalities of its development.

Clinically, early and late signs are recognized, and specific changes in the femur can be recognized easily by roentgen examination.

"Prognosis in Perthes' disease is dependent upon: (*a*) the age of the child, which controls both the severity of the natural course of the disease and the stresses to which the diseased femoral head is to be subjected, (*b*) the stage to which the disease has progressed when treatment is begun and (*c*) the effectiveness of treatment.

"Efficient ambulatory methods of treatment are the calliper, crutches, and patten, and the Trumble's splint. Both these are only really suitable for children over 7 years of age, and each requires constant and understanding supervision in younger children. Traction in recumbency provides the really satisfactory treatment for children under 7 years of age or over this age in a really early stage of the disease. Two methods of providing this treatment are recommended: (*a*) sliding traction with weight and pulley, and (*b*) Pugh's extension."

The results are permanent, as is shown by following up for a number of years some of the patients in whom better results were obtained, and though a normal femoral head has not been obtainable, still it can be nearly approached. Clinically, the severely deformed heads give movement and functions that are nearly normal.

SUMMERFELDT, Toronto, Canada.

CHONDRO-OSTEO-DYSTROPHY (BRAILSFORD-MORQUIO TYPE). R. W. B. ELLIS, Proc. Roy. Soc. Med. **30**:160 (Dec.) 1936.

A case of chondro-osteodystrophy is reported in a girl of 6 years. The report is accompanied by roentgenograms of the right hand, the left knee and the pelvis.

The right hand and the left knee show irregularity and fragmentation of epiphyses and wide interosseous spaces. The pelvis shows irregularity of the femoral heads and of the acetabulums.

WILLIAMSON, New Orleans.

A CASE OF OSTEOGENIC DISEASE WITH MULTIPLE EXOSTOSES. LEREBOULLET, BAIZE and WILLOT, Bull. Soc. de pédiat. de Paris **33**:390 (June) 1935.

A boy, 11 years old, had multiple exostoses involving all the bones except those of the spine and the skull. Bony prominences were first noticed by the parents when the boy was 3 years old. There was no family history of the condition. Biopsy of one of the lesions showed normal bone without any cartilage. The calcium content and the phosphorus content of the blood were normal.

BENJAMIN, Montreal, Canada.

OSTEOCHONDRITIS OF THE HIP, OR LEGG-PERTHES DISEASE. LUIS TORRES MARTY, An. de pediat. **1**:492 (Sept.) 1934.

The literature reveals a great variance of opinion as to the etiologic factors of osteochondritis of the hip, which include endocrine upsets, congenital factors, infectious causes, vascular changes, mycotic emboli, trauma, late rickets and juvenile osteomalacia. Torres Marty expresses the belief that there is in this infection no more than an abnormal osteogenic growth of the endochondral ossification processes or an imbalance between the functioning of the osteoclasts and osteoblasts. He believes that roentgenograms are most important for the correct diagnosis. He gives a good differential diagnosis, and six case reports are included.

HERRON, Spokane, Wash.

PERTHES' DISEASE. ANTONIO R. DA CUNHA, Arch. de pediat., Rio de Janeiro **9**:29 (Nov.) 1936.

The author presents a complete study of Perthes' disease, consisting of a review of the literature and a discussion of the pathologic picture, the differential diagnosis and the methods of treatment. Roentgenograms taken in the three cases described are included.

SANFORD, Chicago.

SUBPERIOSTEAL RESECTION IN CHRONIC OSTEOMYELITIS. JORGE B. SARDINHA, Arch. de pediat., Rio de Janeiro **9**:43 (Nov.) 1936.

The author believes that for chronic osteomyelitis of long standing subperiosteal resection is the treatment of choice. He cites 9 cases and presents roentgenograms and photographs showing the end-results. These appear convincing.

SANFORD, Chicago.

DYSOSTOSIS ENCHONDRALIS. ERICH HÄSSLER, Monatschr. f. Kinderh. **67**:379 (Dec.) 1936.

French and English writers have described under the name dysostosis enchondralis a type of chondrodystrophia which differs from the ordinary form in that typical changes do not appear in the epiphyses and metaphyses until after birth. The writer reports three cases which he believes belong to this group and submits photographs and interesting roentgenograms.

GERSTLEY, Chicago.

A PROBABLE CASE OF RECKLINGHAUSEN'S DISEASE. E. VAN DUSSELDORP, Maandschr. v. kindergeneesk. **5**:397 (July) 1936.

Dusseldorp's patient, a boy of 2 years, presented the symptoms of Recklinghausen's disease of the bones, with the exception of the typical deviations

in the calcium and the phosphorous content of the blood. Spontaneous recovery occurred. He discusses the differential diagnosis of this disease, especially the features distinguishing it from myelomatosis and xanthomatosis.

VAN CREVELD, Amsterdam, Netherlands.

Diseases of the Eye

TREATMENT OF RETINAL GLIOMAS BY THE FRACTIONATED OR DIVIDED DOSE PRINCIPLE OF ROENTGEN RADIATION. H. E. MARTIN and A. B. REESE, Arch. Ophth. **16**:733 (Nov.) 1936.

Treatment of retinal glioma by means of radiation has failed to control the growth without injury to the function of the eye. To overcome this difficulty, the authors have suggested accurate direction of the beam of roentgen radiation, multiple small portals (2.5 cm. in diameter), multiple treatments (from fifty to seventy-five) and a long period of treatment (up to twenty months).

In order not to injure structures of the eye otherwise free from disease and to direct the rays to the area of the tumor only, a metal cylinder 2.5 cm. in diameter is used to confine the beam and direct it to the posterior wall of the globe.

WESCOTT, Chicago.

MANAGEMENT OF CROSSED EYES IN CHILDREN. RUSKIN G. ANDERSON, J. South Carolina M. A. **32**:18 (Jan.) 1936.

This is the familiar story, with emphasis on complete refractive examination by the oculist. Anderson divides the management into three stages: (1) correction of any refractive error, (2) stimulation of binocular single vision and (3) operation.

WESTON JR., Columbia, S. C.

A RETENTION CYST OF UNUSUAL SIZE, PROBABLY OF KRAUSE'S GLAND, SIMULATING ANGIOMA OF THE ORBIT. D. V. GIRI, Brit. J. Ophth. **20**:621 (Nov.) 1936.

A cystic tumor, which was smooth, mobile and nonadhesive to the skin, situated at the upper inner angle of the orbit, was seen in a girl of 9 years. On removal it proved to be a white translucent oval cyst about 3 cm. long and 1.7 cm. broad. Histologically, the cyst appeared to be lined with two layers of cells, a deeply flattened layer and a more superficial cubical layer. In parts there were several layers of cells resembling those of altered conjunctiva. There was a well marked wall of fibrous tissue, and here and there were nodules of lymphocytes. The diagnosis was a probable retention cyst arising from the conjunctiva or a gland of Krause. The growth was not an ordinary dermoid.

The article is illustrated.

W. ZENTMAYER. [ARCH. OPHTH.]

GLIOMA RETINAE TREATED BY RADON SEEDS. H. B. STALLARD, Brit. M. J. **2**:962 (Nov. 14) 1936.

This paper reports a case of glioma retinae and the results of treatment with radon seeds.

ROYSTER, University, Va.

THE FAMILIAL FORM OF RETINITIS PIGMENTOSA WITH BLINDNESS AND OBESITY OF CEREBRAL ORIGIN (FIRST ANATOMIC OBSERVATION). L. VAN BOGAERT and P. BORREMANS, Ann. de méd. **39**:54, 1936.

The disease which is commonly known as the Laurence-Biedl syndrome is characterized by the association of adiposity and retinitis pigmentosa. Many other accessory malformations have been described: polydactylism, congenital cataract, congenital nystagmus, strabismus and deformation of the spine and skull. There is congenital retardation of mental development. Van Bogaert and Borremans describe the simultaneous occurrence of the syndrome in two

brothers, the mother of whom suffered from keratitis and was mentally subnormal. In the first brother retinitis developed in early youth, and at the age of 10 years abnormal obesity was noticed. He died at the age of 29, of cardiac insufficiency. The only pathologic feature noticed at autopsy was symmetrical hyperostosis of the frontal bones, with adhesions of the dura mater. The brain was grossly normal, and sections through the region of the tuber cinereum did not show any histopathologic changes. There was, however, a peculiar necrosis with hyalinization of the center of the infundibulum. The anterior lobe of the hypophysis was intact. The second brother had visual disturbances at the age of 7 years and was mentally retarded. At present, at the age of 29, he shows dystrophia adiposogenitalis, with retinitis pigmentosa, cataract, rotatory nystagmus and brachydactylia.

WEIL, Chicago. [ARCH. NEUROL. & PSYCHIAT.]

TUMOR OF THE OPTIC NERVE (NEUROPERINERVOSA GLIOMATOSA). F. ROSSEAU, A. DOLLFUS and G. ARDOIN, Bull. Soc. d'opht. de Paris, October 1935, p. 629.

For the past two years it had been noted that a boy of 7 years had prominence of the right eye. From time to time there had been spontaneous recession to normal. The exophthalmos was not reducible; excursion upward was nil, and that in all other directions was limited, mostly laterally. The lids could be closed, and the cornea was well protected. The papilla showed stasis, with atrophy of the superior portion of the optic nerve. Pupillary reaction was absent, although vision was equal to counting fingers at 30 cm. The sinuses were not involved. The tumor is pictured grossly, and several photomicrographs show the nature of the tissue cells. The tumor entirely surrounded the optic nerve.

MAYER, Chicago. [ARCH. OPHTH.]

TREATMENT OF TRACHOMATOUS CONJUNCTIVITIS IN CHILDREN. A. F. MACCALLAN, Rev. internat. du trachome **13**:171 (Oct.) 1936.

The child of a mother with active trachoma can escape infection only by a miracle. Follicles on the upper tarsus are not pathognomonic of trachoma unless accompanied by infiltration and vascularization of the periphery of the upper part of the cornea or unless, as in the second stage, bleblike excrescences occur which rupture on pressure, with exudation of a gelatinous material. These excrescences must be destroyed by grattage at several séances. Conjunctival discharge is generally due to superimposed bacterial infection. This necessitates instillation of antiseptic agents. Silver nitrate is of value, but the organic silver compounds are not.

LEBENSOHN, Chicago. [ARCH. OPHTH.]

KERATITIS PUNCTATA SUPERFICIALIS AND SWIMMING POOL CONJUNCTIVITIS: SOME CASES IN THE CHINESE. W. P. LING, Chinese M. J. **50**:1381 (Oct.) 1936.

A uniform clinical picture of keratitis punctata superficialis is reported in detail, resembling that described by Fuchs. The central part of the cornea is the part most frequently affected. The lesion consists of a variable number of small oval grayish white spots in the superficial layer. No ulceration occurs. In the cases reported, catarrhal inflammation of the conjunctiva preceded the keratitis, often of the swimming pool type, which the author regards as genito-urinary in origin. Fifty-three cases were included in the report, which is fairly comprehensive.

NEFF, Kansas City, Mo.

Skin Diseases; Allergy

NEVOXANTHO-ENDOTHELIOMA OR JUVENILE XANTHOMA. F. E. SENEAR and M. R. CARO, Arch. Dermat. & Syph. **34**:195 (Aug.) 1936.

Senear and Caro report the case of a boy 5½ years old who had yellowish nodules on his trunk, extremities and left eyelid. The lesions started a the age of 3

with the appearance of a small reddish papule on the left thigh, which when the authors saw it was yellowish and had grown. Others had appeared until he had more than a dozen nodules, varying in diameter from that of a pinhead to 1.5 cm. The pathologic observations at two biopsies, made at an interval of one year, are given. The second specimen showed much more fibrous tissue, and "the vessels showed swelling of the poorly stained endothelial cells often completely occluding the lumen." This was interpreted to mean that the lesions were beginning to heal spontaneously, which is the general rule regarding the course of such lesions. The authors compared their case with other cases and feel that it is an instance of the rare type of lesion previously reported as nevoxanthoma-endothelioma. Their experience with this case has made them dubious that endothelioma was present in some of the cases reported. They believe that many of these cases will prove eventually to belong to the group of juvenile xanthoma, as this does.

DULIN, Iowa City.

SODIUM THIOSULFATE IN THE TREATMENT OF SCABIES. G. V. KULCHAR and W. M. MAININGER, Arch. Dermat. & Syph. **34**:218 (Aug.) 1936.

The patient is directed to bathe with soap and water and when thoroughly dry to apply a 40 per cent aqueous solution of sodium thiosulfate to the entire body except the head and face, paying special attention to the areas between the fingers, the flexural surfaces of the wrists and the breasts, abdomen, buttocks, thighs and external genitalia. In fifteen minutes a 4 per cent hydrochloric acid solution is applied in a similar way. One hour later the applications are repeated. The same procedure is followed the next day. On the third day the patient changes all clothing, night clothes and bedding, and these are sterilized by boiling for five minutes. Of fifty patients treated thus, all were free from scabies within a week, whereas of a control group of fifty treated with the ointment, thirty-one were free from scabies. The sodium thiosulfate and hydrochloric acid method of treatment is advantageous in that it is not greasy and the smell of sulfur lasts only a short while after the application of the hydrochloric acid. It is the hydrogen sulfide produced that is lethal to acarids and their ova.

DULIN, Iowa City.

ECZEMA DUE TO DYED CLOTHING: REPORT OF FIFTEEN CASES. P. BONNEVIE and V. GENNER, Arch. Dermat. & Syph. **34**:220 (Aug.) 1936.

Fifteen cases of eczema due to the dye in clothing are reported. In all the eruption was due to blue dye, except that in one case distress was reported from both blue and brown garments. The sites of predilection were the axilla, the neck and the bend of the elbows, or wherever the dyed garment came in contact with the skin. The hyperhidrosis of the axilla and the use of antihidrotic drugs and of depilatories seemed to aggravate the condition; the eczema here was generally of a moist vesicular type, whereas in other areas it was of a dry papular character. The eczema seemed to be particularly chronic and remained several months after the patient had discarded the offending garment.

DULIN, Iowa City.

FATAL IODODERMA: THE ELEVENTH CASE REPORTED IN THE LITERATURE. L. HOLLANDER and G. H. FETTERMAN, Arch. Dermat. & Syph. **34**:228 (Aug.) 1936.

Hollander and Fetterman review the ten previously reported cases and present the history, course and pathologic observations in their case. The lesions were nodular, tumorous, ulcerative and scar-productive and appeared as a multiform eruption because they were seen at various stages. The iododerma occurs because of an idiosyncrasy of the patient for iodine. The sensitivity manifests itself in the kidneys and central nervous system as well as in the skin. Ordinarily the iododerma clears up when the use of iodine is discontinued. The treatment consists in discontinuing the administration of iodine, giving sodium chloride intravenously and applying moist dressings to the lesions. Detailed pathologic descriptions of the necropsy specimens and several photographs of the lesions are given.

DULIN, Iowa City.

THE PIGMENTARY FORM OF VERRUCA PLANA. S. W. BECKER, Arch. Dermat. & Syph. **34**:265 (Aug.) 1936.

Becker reports three cases of hyperpigmentary verruca plana. These occurred on the face in two women and on the hands and forearm in another. Such lesions vary in diameter from that of a pinpoint to 1 cm. They are yellowish brown, with a nonelevated, nonverrucous, smooth surface and differ from ephelides and lentigines in that they can be curetted while the latter two lesions cannot. Histologic examination verified the diagnosis in two of the cases. The pigment was melanin and was located chiefly in the basal portion of the epidermis. The absence of dendritic cells showed the process to be relatively inactive. A photograph of the lesions and a photomicrograph of the histologic section are included.

DULIN, Iowa City.

TRI-ETHANOLAMINE: AN ADJUNCT TO DERMATOLOGIC THERAPY, WITH SPECIAL REFERENCE TO RINGWORM OF THE SCALP. M. T. R. MAYNARD, Arch. Dermat. & Syph. **34**:268 (Aug.) 1936.

Maynard first used triethanolamine because it reduced the surface tension of the skin and allowed better penetration of the drugs. It has been found particularly useful in facilitating the removal of ointments and oily preparations from the skin and hair. The use of triethanolamine in ointments containing heavy metals is not desirable because it reacts with the metal and when used causes staining of the skin. The following three prescriptions are given, which the author found particularly useful in applying juniper tar to the hair and in treating dermatophytosis and ringworm of the scalp, respectively.

1. Juniper tar U. S. P. ..... 12 Gm.
   Triethanolamine ..... 10 Gm.
   Liniment of soft soap U. S. P. ..... 120 Gm.
   Label: To be applied three hours before the hair is washed.
2. (*a*) Oxyquinoline sulfate ..... 0.3 Gm.
   Triethanolamine ..... 4.0 Gm.
   Ointment of coal tar ..... 30.0 Gm.
   (*b*) Oxyquinoline sulfate ..... 0.3 Gm.
   Triethanolamine ..... 4.0 Gm.
   Compound ointment of benzoic acid, N. F. ..... 30.0 Gm.
   Label: Alternate these ointments every three days.
3. Iodine crystals ..... 4 Gm.
   Triethanolamine ..... 4 Gm.
   Goose grease ..... 30 Gm.

DULIN, Iowa City.

XERODERMA PIGMENTOSUM. M. T. MACKLIN, Arch. Dermat. & Syph. **34**:656 (Oct.) 1936.

Macklin believes that xeroderma pigmentosum is an inherited disease and feels that the term "familial" is a misnomer and should be discarded. She attempts to prove the following statements: Xeroderma pigmentosum is dependent on a set of recessive determiners located in a pair of chromosomes not connected with sex. In the majority of the families concerned, owing to their small size, the disease tends to affect but one child, although its occurrence in two or more children is not rare. It tends to affect the two sexes equally. Macklin applies mathematical formulas to prove these statements and shows that the observations on xeroderma pigmentosum agree with the expectations demanded by the formulas on theoretical grounds. Since the disease is transmitted as a recessive condition, normal-appearing parents may produce affected offspring and, as is to be expected, when the disease appears in the children of consanguineous marriages, the number of children affected is greater than when the parents are unrelated.

DULIN, Iowa City.

ATOPIC DERMATITIS (DISSEMINATED NEURODERMATITIS) OF YOUNG ADULTS: ANALYSIS OF PRECIPITATING FACTORS IN ONE HUNDRED AND ONE CASES AND REPORT OF TEN CASES WITH ASSOCIATED JUVENILE CATARACT. LOUIS A. BRUNSTING, Arch. Dermat. & Syph. **34**:935 (Dec.) 1936.

Cases of atopic dermatitis are reported in 101 patients, whose ages ranged from 13 to 35 years and of whom 54 were females and 47 males. A large proportion, 71 patients, gave histories of eczema in infancy, of past or present seasonal hay fever or of asthma. Cutaneous tests for offending allergens were positive in 70 of the 101 patients tested. The positive reactions were distributed in the various groups as follows: ragweed, 32; orris, 25; silk, wool and house dust, 21; animal danders and other emanations, 29, and foods, 40. Foods found to offend most frequently were cereals, milk, egg white, fish and other sea foods, chocolate, nuts and chicken. Of 55 cases, in 21 there were positive reactions to patch tests, among the most common being to potassium arsenite, potassium iodide, nickel nitrate and turpentine. This is particularly interesting, in view of the fact that the first two are especially efficacious in the treatment of kindred conditions, such as asthma, hyperesthetic rhinitis and pruritis, which are often encountered in patients with atopic dermatitis.

In 10 cases cataract was associated with atopic dermatitis. This association is more than coincidental, but the mechanism that is responsible for the production of the cataracts is not understood. Disturbances in general health associated with the disease were rare and slight. Anything that upsets the emotional stability of the patient tends to aggravate the cutaneous lesions.

The treatment consisted of the application of antipruritic salves. Coal tar is especially well tolerated and may be supplemented by ultraviolet irradiation to the point of producing tanning. The disease is resistant to all forms of therapy during the first three or four years after puberty, and the use of arsenic and roentgen rays then must be thoroughly weighed because of their possible influence on the production of cataracts. The building up of physical and emotional reserves is important. Environmental irritants, such as wool, silk, dusts, feathers and orris in cosmetics, should be avoided. From the diet should be eliminated eggs, nuts, fish and other sea foods, pork, tomatoes, fresh berries, chocolate, cheese, condiments and coffee. These may be added to the diet gradually as improvement occurs. The moderate use of sedatives may be desirable. DULIN, Iowa City.

ATYPICAL FORMS OF SKIN TUBERCULOSIS IN COLORED CHILDREN. ELMORE B. TAUBER and LEON GOLDMAN, Arch. Pediat. **53**:540 (Aug.) 1936.

A 6 year old colored girl with mediastinal tuberculosis showed extensive erythema exudativum multiforme of a bullous type.

One-tenth and one milligram, respectively, of human and bovine tuberculin elicited no Mantoux reaction. Two milligrams of human tuberculin also produced no response, while an equal amount of bovine tuberculin resulted in an intense reaction. A huge bullous lesion 2 cm. in diameter, surrounded by a firm reddened areola, developed at the site of the test. There was no systemic reaction. This reaction lasted for three weeks.

Tauber and Goldman state that the tuberculin reaction suggested, but did not prove, the association of the erythema exudativum multiforme and the tuberculosis.

ORR, Buffalo.

CALCINOSIS INTERSTITIALIS UNIVERSALIS. RALPH M. TYSON and SIDNEY WEISS, Arch. Pediat. **53**:551 (Aug.) 1936.

The first case of calcinosis was described by Weber in 1878, who thought the condition was a form of gout. In 1909 Krause introduced the term interstitial calcinosis. Rudolph in 1934 described three types of abnormal deposition of calcium in the tissues and organs: (1) progressive myositis ossificans, in which true

formation of bone occurs; (2) metastatic calcification, characterized by deposits of calcium in the heart, lungs, kidneys and other organs, with no involvement of the muscles, fasciae, tendons and subcutaneous tissues; (3) calcinosis universalis, characterized by deposition of calcium in the tendons, fasciae and subcutaneous tissues.

Tyson and Weiss report a case of calcinosis universalis in a 10 year old white boy. The patient had been well until he was 6 years old. When he was seen in June 1935 there was marked limitation of motion in the shoulders, elbows and hip joints. Scattered over the skin of the body were numerous discrete nodules. These were movable and about the size of a pea.

Roentgen examination showed diffuse calcification throughout the body. In the thighs and legs this calcification was visualized throughout the soft tissues as streaks of calcium in the muscles and subcutaneous tissues.

A specimen taken for biopsy from the anterior abdominal wall consisted of several small fragments of tough connective tissue in which there were sandy, yellowish deposits. The microscopic study showed dense hyaline connective tissue which appeared as a coarse fibrillar substance in which were numerous spindle-shaped nuclei. There were large spaces containing a bluish granular deposit the appearance of which was characteristic of the microscopic appearance of decalcified tissue.

The serum calcium content at the time of the patient's admission to the hospital was 15 mg. per hundred cubic centimeters. This later dropped to 10.9 mg.

Disodium phosphate was administered with the hope of increasing the excretion of calcium. The authors feel there was in this case marked improvement following the oral administration of the disodium phosphate. ORR, Buffalo.

INFANTILE ECZEMA: RELATION TO SPECIFIC INGESTA. H. J. RINKEL, Arch. Pediat. **53**:559 (Aug.) 1936.

A nursing girl subject to infantile eczema was successfully treated after systemic study of the relation of the ingestion of specific foods by the mother to the onset of pruritis and the development of eczema in the infant. These observations were made in their entirety by the mother. The foods isolated by this procedure were peach, onion, rhubarb, banana, string bean, peanut and yeast. After their elimination from the mother's diet the infant's eczema ceased, and it recurred only when deliberate feedings of these foods were instituted.

ORR, Buffalo.

ERYTHEMA MULTIFORME HEMORRHAGICA. H. GOODMAN, Arch. Pediat. **53**:676 (Oct.) 1936.

Goodman reports a case of erythema multiforme haemorrhagica in a 7 year old Italian boy.

ORR, Buffalo.

PROPHYLAXIS OF INFANTILE ECZEMA. THE DIET OF THE EXPECTANT MOTHER. HERMAN GOODMAN and MARJORIE BURR, Arch. Pediat. **53**:790 (Dec.) 1936.

The authors state that infantile eczema is not a disease of the skin in itself but an indication of absorption of toxic substances resulting from the incomplete digestion of food. They assume that dietary indiscretions of the expectant mother have a decided influence on the appearance, or at least on the severity, of the eczema of her child. On this basis they submit an outline of a diet for expectant mothers, particularly when there is a history of infantile eczema in the family of either the father or the mother.

The diet consists of nothing more than that of the average adult.

ORR, Buffalo.

DERMATOPHYTOSIS OF THE FEET, HANDS AND GROINS. W. J. MORGINSON, Illinois M. J. **70**:371 (Oct.) 1936.

In this paper Morginson presents therapeutic procedures for curing dermatophytosis of the feet, hands and groins. The main consideration is not to use strong medications for the acute, vesicular stage and to adjust the medications as the stages of the infection change. The strengths of the medicaments should be gradually increased as the conditions improve. Treatment should be continued several weeks after apparent clinical cure, and medicines should be applied to the apparently normal skin several inches beyond the evident infection in an endeavor to destroy spores and permanently eradicate the disease.

For the vesicular stage Morginson advises the use of only boric acid compresses. Whenever there are vesicles without too much inflammation he believes that a modified solution of aluminum acetate U. S. P. is indicated. For the groins, a calamine-zinc lotion generally gives relief in preparation for stronger medications. When there are no vesicles, in an endeavor to decrease perspiration, the mild compound ointment of benzoic acid N. F. may be applied at night and a dusting powder during the day. When the lesions are squamous, dry, fissured and hyperkeratotic, stronger medications, such as coal tar ointment or a salicylic acid and iodine dusting powder, may be used. BARBOUR, Peoria, Ill.

A STUDY OF BLOOD CONSTITUENTS IN POLLINOSIS WITH AND WITHOUT TREATMENT. M. L. HATHAWAY, B. Z. RAPPAPORT, C. I. REED and H. C. STRUCK, J. Allergy **8**:1 (Nov.) 1936.

Vitamin D, in the form of viosterol, in doses of more than 4,000 units per kilogram of body weight per day, gave protection against pollinosis in a large number of cases. When these doses were used in combination with hyposensitization to pollen, marked protection was noted in 90 per cent of the cases.

Huge doses of vitamin D should not be used when there is any pathologic condition of the kidneys.

The protective action is not correlated with any change in either the calcium or the potassium content of the blood. The protective action of vitamin D cannot be determined from the data available at present. HOYER, Cincinnati.

HOUSE DUST HYPERSENSITIVITY IN PERENNIAL ASTHMA OF CHILDHOOD. HENRY N. PRATT, J. Allergy **8**:60 (Nov.) 1936.

The author's summary is as follows:

"By means of intracutaneous tests and passive transfers it has been determined that approximately 79 per cent of children between the ages of one and twelve years who suffer from perennial asthma are skin sensitive to house dust extract and have reagins to this atopen in their serums. The frequency and severity of this sensitivity as evidenced by the magnitude of the skin test and passive transfer reaction increase with the advancing years of childhood." HOYER, Cincinnati.

CALCIUM IN THE TREATMENT OF ALLERGY. J. A. RUDOLPH, M. Rec. **144**:191 (Aug. 19) 1936.

Calcium has merit in the treatment of allergic conditions, first, because of its effect in diminishing the irritability of the sympathetic nervous system and, second, because of its influence in reducing the permeability of the walls of the cells. The following conclusions were reached by Rudolph after a year's study of thirty-six cases:

1. Calcium therapy is frequently effective in bringing about clinical improvement in allergic disorders.

2. Prior reports suggesting the ineffectiveness of calcium represent conclusions drawn from too small a number of cases surveyed in too brief a time.

3. Calcium should be given indefinitely, as part of the regular diet, to any person suffering from an allergic disorder. WILLIAMSON, New Orleans.

CLINICAL EVALUATION OF A NEW TRICHOPHYTON EXTRACT. J. J. ELLER and A. KAZANJIAN, New York State J. Med. **36**:1815 (Dec. 1) 1936.

Fifty patients with ringworm infections were treated with Fonseca's polyvalent fungus vaccine. The vaccine seemed to shorten the course of the infections, but the results were not as striking as those described in the earlier reports in the literature.

AIKMAN, Rochester, N. Y.

A DISCUSSION OF THE TREATMENT OF HAY FEVER, VASOMOTOR RHINITIS, AND ASTHMA. A. VANDER VEER, New York State J. Med. **36**:1854 (Dec. 1) 1936.

In this general discussion of allergy an interesting chart is shown which gives the pollination periods of the various air-borne pollens of the northeastern portion of the United States.

AIKMAN, Rochester, N. Y.

ON THE AETIOLOGY OF ERYTHEMA NODOSUM. LOUIS FORMAN, Brit. J. Dermat. **48**:123 (March) 1936.

Forman supports the Continental concept that erythema nodosum is a reaction of a sensitized skin to many bacterial antigens, including the tubercle bacillus, the hemolytic streptococcus, the bacillus of soft sore and the virus of lymphogranuloma venereum. He reports thirty-one cases which were investigated rather carefully and followed. In most of the fifteen cases occurring in children aged from 3 to 15 years there was strong evidence of a tuberculous origin, while in the majority of cases in persons aged from 20 to 68 the condition seemed due to the hemolytic streptococcus, as revealed by immunologic tests. The lesions tended to be large and painful. Recurrence of erythema nodosum is common. The prognosis is better for adults than for children.

PACE, Evanston, Ill. [ARCH. DERMAT. & SYPH.]

ECZEMA IN AN INFANT MUCH IMPROVED AFTER THE ADMINISTRATION OF SPLENIC EXTRACT BY MOUTH. PIERRE DELTHIL, Bull. Soc. de pédiat. de Paris **33**:397 (June) 1935.

A 9 month old boy with eczema was given 40 drops of splenic extract daily by mouth. After one week of this treatment, the eczema, which had made its appearance when he was 2 months old, showed marked improvement. The improvement lasted for two weeks, when the mother discontinued the administration of the extract because of a digestive upset. It was planned to resume this form of treatment to observe whether the condition of the skin would clear completely.

BENJAMIN, Montreal, Canada.

TREATMENT OF INFANTILE ECZEMA WITH MATERNAL BLOOD. L. NOVOA, Fisiopat. inf. **11**:65, 1934.

Twenty infants less than 2 years of age were studied (thirteen with facial and seven with generalized eczema). The blood group of the mother and of the child and the leukocyte count of the child were determined. Tests for alimentary allergy to food extracts were positive in fifteen of the twenty infants. The diets used were breast, mixed and general. Three cases are cited: 1. B. C., 4 months old, had generalized eczema and was fed breast and cow's milk; the mother and the child were of blood group Ab; the blood showed 24 eosinophils, 10 polymorphonuclears, 42 lymphocytes and 20 monocytes; 5 cc. of blood was injected, the amount being increased to 10 cc., every second day for ten injections. 2. F. A., 6 months old, had generalized eczema and was breast fed; the mother was of blood group Ab; the son, of Oab; the blood showed 3 eosinophils, 29 polymorphonuclears, 39 lymphocytes and 29 monocytes; six injections were given as in case 1. 3. F. L., aged 14 months, had facial eczema and was on a general diet; the mother was of blood group Ab; the daughter of Oab; the blood showed 11 eosinophils,

11 polymorphonuclears, 77 lymphocytes and 1 monocyte; six injections were given as in case 1. Two of the infants were cured (eczema very mild); four presented absolute failure of treatment; fourteen showed temporary improvement with subsequent failure. In no patient with eczema of medium or great intensity treated by Novoa with this technic was there any benefit aside from a passing improvement which did not compensate for the annoyance to the mother and child.

GIFFEN, Toledo, Ohio.

PECULIAR ALLERGY TO LIVER EXTRACT. WILHELM MILBRADT, Dermat. Wchnschr. **101**:1595 (Dec. 21) 1935.

In a 10 year old child who was receiving liver extract by mouth dermatitis developed while treatment with acetarsone was being administered for congenital syphilis. After several weeks an erythematous eruption developed immediately after each dose of liver extract was taken. The same reaction occurred when other liver preparations were used.

TAUSSIG, San Francisco. [ARCH. DERMAT. & SYPH.]

EPIDERMOLYSIS BULLOSA HEREDITARIA DYSTROPHICA LOCALISATA. L. N. MASCHKILLEISSON and L. A. ABRAMOWITSCH, Dermat. Wchnschr. **101**:1600 (Dec. 21) 1935.

The authors describe the case of an 11 year old girl who had a bullous eruption involving principally the trunk from the level of the nipples to the inguinal folds and from the shoulder blades to the sacrum. A few lesions appeared on the scalp and in the mouth. Hypertrophic changes on all the toe-nails and on two fingernails were noted. The teeth were dystrophic. The limbs showed no lesions even after considerable trauma. The disorder appeared shortly after birth, and the slightest trauma caused a bulla to develop in the affected area. Microscopic examination of sections of material taken from an uninvolved area showed a normal elastic tissue content.

TAUSSIG, San Francisco. [ARCH. DERMAT. & SYPH.]

THE PATHOGENESIS OF SCLERODERMA IN RELATION TO THE PARASYMPATHETIC FIBER. KEN KURÉ, KENJI YAMAGATA and YOSHITOMO KANEKO, Klin. Wchnschr. **11**:1415 (Aug. 20) 1932.

In a study of the cutaneous nerves of sclerodermic areas the authors found that the small medullated fibers were most severely degenerated, while the large and middle-sized medullated fibers were intact or showed but slight changes. Because the parasympathetic fibers are small and medullated and in addition contain trophic fibers, the authors considered the possibility that the sclerodermic changes might be evoked through degeneration of the trophic or parasympathetic nerve fibers in the affected regions. They wondered, too, whether improvement might not be brought about by excitation of these trophic fibers. For this purpose they made use in some cases of subcutaneous injections of 0.2 cc. of 1 per cent solution of pilocarpine and in others of the cutaneous application of a hydrous wool fat ointment containing 1 per cent pilocarpine; with the latter they used plain hydrous wool fat in another sclerodermic region as a control. They report five cases in adults and assert that the skin became softer and the pigmentation was reduced. The results were equally good with subcutaneous injections and with the pilocarpine ointment and became apparent in from one to three weeks.

SILVERMAN, Syracuse, N. Y.

ERYTHEMA NODOSUM ASSOCIATED WITH SCARLET FEVER. E. MORO, Ztschr. f. Kinderh. **57**:321 (July 6) 1935.

After reporting a case in which erythema nodosum developed on the sixteenth day after the onset of scarlet fever in a 5 year old boy in whom the findings were

entirely negative for tuberculosis, Moro discusses the etiology of erythema nodosum. Although he admits that tuberculosis is the most prominent factor, he thinks that its importance is overrated. The fact that from 96 to 98 per cent of the patients with erythema nodosum present a positive reaction to tuberculin does not necessarily indicate a tuberculous origin of the disorder. Since erythema nodosum appears late during scarlet fever (at about the time other complications appear) it may be an allergic phenomenon.

SIEMSEN, Chicago.

VALUE OF BUCKY RAYS IN THE TREATMENT OF DERMATOLOGIC DISEASES. A. I. ILIEVICH, Vrach. delo **19**:1079 (Dec.) 1936.

The ultrasoft roentgen rays, called by G. Bucky "borderland rays," were used by Ilievich therapeutically in a large series of dermatologic conditions, comprising, streptococcic and staphylococcic infections, tuberculids, exudative dermatoses of various origins, and keratosis, dyskeratosis and parakeratosis. He believes that the use of Bucky rays constitutes a valuable method of treatment, which gives in certain cases more satisfactory results than the use of roentgen rays. They possess certain qualities which make their use more desirable than that of roentgen rays. They are less harmful to the skin as compared with roentgen rays and are to be preferred for application to hair-covered regions or when there is necessity for repeated irradiation.

BODER, Los Angeles.

TREATMENT OF ERYTHRODERMIA DESQUAMATIVA (LEINER) WITH VITAMIN D. Y. KITAMURA, J. Pediat. (Tokyo), no. 345, Aug. 20, 1936, p. 1129.

Kitamura reports four cases of erythrodermia desquamativa (Leiner), two of which occurred in homozygous twins, and reviews sixteen other cases reported in the Japanese literature. The majority of the reported cases were observed in boys under 3 months of age. The oldest patient was a 7 month old girl. Aside from the skin lesions, one outstanding symptom was gastro-intestinal dysfunction, although the majority of subjects were breast-fed infants. The author's four patients were treated by administration of adequate doses of vitamin D and by strict regulation of feeding.

KATO, Chicago.

A CASE OF ACUTE LUPUS ERYTHEMATOSUS. J. STRANDBERG, Hygiea **98**:636 (Sept. 9) 1936.

The patient was a boy aged 6 years. The tuberculin test was positive, with a focal reaction of the erythema. There was tuberculosis of the glands at the hilus. Subsequently he contracted scarlatina, after which he began to have fever of a remittent type, with fresh spread of the erythema. Areolar alopecia developed. In April 1935 he contracted pleurisy and died in May. Postmortem examination showed a primary complex in the lungs and caseous lymphadenitis of the mesenterium.

WALLGREN, Göteborg, Sweden.

Surgery and Orthopedics

ABDOMINAL SURGERY IN CHILDREN. W. C. JONES, Arch. Pediat. **53**:683 (Oct.) 1936.

The author presents a review of the results in forty-nine cases of major abdominal operations in children.

ORR, Buffalo.

CORRELATION OF CLINICAL TREATMENT OF BURNS WITH RECENT EXPERIMENTAL STUDIES. H. N. HARKINS, Illinois M. J. **70**:332 (Oct.) 1936.

A review of recent experimental work on burns and a study of extensively burned patients has led Harkins to believe in the merit of tannic acid therapy

Severe burns are prone to produce shock, and, whether this is due to toxins or to loss of fluids, a protein-precipitating agent theoretically should be of advantage. In the treatment of granulating surfaces in areas of old burns, tannic acid has no rôle. The adoption by plastic surgeons of saline dressings as the chief means of treatment preliminary to grafting should not serve as a standard for general practitioners or surgeons who see burns early. For fresh extensive burns the author believes that tannic acid still has therapeutic importance.

BARBOUR, Peoria, Ill.

INDICATIONS FOR INFANT CIRCUMCISION. F. WELSH, Brit. M. J. **2**:714 (Oct. 10) 1936.

Welsh describes the infant prepuce as observed when indications for operation are present, dealing only with cases in which the prepuce is phimotic or paraphimotic and cannot be readily separated from the glans. The operative technic which he has found satisfactory is described.

ROYSTER, University, Va.

CONGENITAL DISLOCATION OF THE HIP. F. BAUER, Lancet **1**:1057 (May 9) 1936.

Bauer's study of the causes of congenital dislocation of the hip has led him to the conclusion that cramped intra-uterine posture, limitation of movement and adduction of the joint further its development. His method of treatment rests on these facts, as well as on prophylaxis and early diagnosis of deformities—dislocation, subluxation and the presence of a flat acetabulum.

The necessary early diagnosis is made in the fourth to eighth week by recognizing the effects of the fetal posture. Treatment begins as early as possible. Function is as natural as possible, and the legs are spread as far as is necessary by means of abduction braces made of cotton webbing. The injurious fixation hitherto used is avoided. The result of the treatment in all cases is rapid mechanical cure without danger of recurrence.

By using Bauer's method of examination, not only cases of congenital dislocation (incidence about 3 in 1,000), but also a much larger group of joints showing high grade underdevelopment due to fetal cramping (3 in 100), can be recognized.

LANGMANN, New York.

TREATMENT OF BURNS AND SCALDS WITH A SILVER NITRATE OINTMENT. A. KISSMEYER, Lancet **2**:985 (Oct. 24) 1936.

For about twenty-five years at the Kommunehospital in Copenhagen silver nitrate in the form of an ointment has been used in the local treatment of burns and scalds with most gratifying results. The composition of the ointment is as follows: silver nitrate, 25 Gm.; distilled water, 25 Gm.; olive oil, 25 Gm.; wool fat, 50 Gm.

The wound is first cleansed with physiologic solution of sodium chloride, and the vesicles are removed. A thick layer of this ointment, smeared on a piece of soft linen, is then applied and covered with oil silk or other impermeable material. The ointment is renewed daily.

LANGMANN, New York.

CERVICAL SYMPATHETIC GANGLIONS AND THEIR IMPORTANCE IN SURGERY. M. VILAR VIDAL, An. de pediat. **1**:627 (Nov.) 1934.

Vilar Vidal describes in detail the cervical sympathetic ganglions in six cases in which he dissected them out postmortem. He then describes the anatomic variation and their importance in surgical procedures. Two cases illustrate his paper.

HERRON, Spokane, Wash.

SUPRACONDYLAR FRACTURES IN CHILDREN. F. JIMENO-VIDAL, Paidoterapia **13**:989 (Feb.) 1935.

Jimeno-Vidal gives a short résumé of the historical evolution of the treatment of supracondylar fracture. One has to follow exactly the general principles of the therapeutics of fracture—exact reduction, rigid immobilization and functional treatment. Exact reduction can be obtained by manual traction of the forearm with the elbow bent (90 degrees) and the forearm in pronation when the deviation is in varus and with the forearm in supination in those cases in which it is in valgus. A critic of the treatment is made by hyperflexion. After reduction, immobilization by plaster cast is done for four or five weeks. Functional treatment includes moving the free articulations during immobilization and massage after bony union has occurred.

HERRON, Spokane, Wash.

EXPERIENCE WITH TRIBROMETHANOL IN AMYLENE HYDRATE AS A NARCOTIC FOR CHILDREN. A. OBERNIEDERMAYR, Klin. Wchnschr. **11**:1710 (Oct. 8) 1932.

In about 3,700 rectal injections of tribromethanol in amylene hydrate for anesthesia in infants and children there were no fatalities. The dose in infants was 0.1 Gm. per kilogram of body weight. The maximum dose in children was 0.125 Gm. per kilogram. The anesthesia did not prove sufficient in about 11.2 per cent of the cases. When the rectal injection was not retained, it was not considered advisable to repeat the dose.

SILVERMAN, Syracuse, N. Y.

Teeth and Dentistry

WHEN SHOULD ORTHODONTIC TREATMENT BE INSTITUTED? M. J. FUTTERMAN, Dent. Items of Interest **58**:872 (Oct.); 984 (Nov.) 1936.

The author presents an exhaustive survey of this problem, based on his personal experience and that of his contemporaries, as well as on that of many eminent writers of the past. His conclusions are as follows: 1. The malocclusions are rarely self-corrective. 2. The Bogue and Stanton guide for lateral development is inaccurate. 3. Lateral development is advocated only when there is extreme narrowing of the deciduous arches and only before absorption of the deciduous cuspids and molars has started. 4. Treatment of patients in class III should be carried out at an early age unless there is an extreme micromaxillary or macromandibular development. 5. Early correction of cases in which there is definite buccolingual displacement of individual teeth or groups of teeth is advocated. 6. Early treatment of over-bites is opposed. 7. Early closure of spaces between erupting permanent teeth is opposed. 8. If upper protrusion in the deciduous arch has been caused by habit pressure, the condition will usually be self-corrective if that habit is broken at about 6 years of age. 9. Space maintainers should be inserted immediately wherever there has been premature loss of teeth. 10. The author does not advocate the mechanical treatment of patients in class II at an early stage except to correct the upper anterior teeth when they overjet the lower lip or to trim the cuspid points to allow for a forward placement of the mandible.

WHITSON, Brooklyn. [ANGLE ORTHODONTIST]

CHRONIC ENDEMIC DENTAL FLUOROSIS. H. T. DEAN, J. A. M. A. **107**:1269 (Oct. 17) 1936.

Endemic hypoplasia of the permanent teeth, known as chronic endemic dental fluorosis or as mottled enamel, is a water-borne disease associated with ingestion of fluorides in culinary water during the calcification of the affected teeth. The etiologic factor is at work during the development of the teeth, so that the affected teeth when they erupt show dull chalky white areas, which often later assume a characteristic brown color. In severely involved teeth discrete or confluent pitting appears. In the United States there are about 335 areas, in 25 states, most

of which are west of the Mississippi, in which the condition is endemic. The threshold of toxicity in drinking water is not definitely established, but amounts of fluorine not exceeding 1 part per million are of no significance for public health. Other skeletal involvements in children are thought by some to be a part of fluorosis, but so far these have not been observed in adults. The disease is readily preventable by prohibiting the use of water containing fluorides in excess of the permissible units. Strongly toxic water should be abandoned, and waters containing less than 2 parts fluorine per million should be diluted to the permissible level of fluorine by uncontaminated water. It should be remembered that the only persons needing protection are children under 8 years of age. If necessary, cistern water or distilled water can be used for them.

BONAR, Salt Lake City, Utah.

THE NEONATAL LINE IN THE ENAMEL AND THE DENTINE OF THE HUMAN DECIDUOUS TEETH AND FIRST PERMANENT MOLAR. I. SCHOUR, J. Am. Dent. A. **23**:1946 (Oct.) 1936.

From an examination of decalcified and ground sections of 350 human deciduous teeth picked at random from several distinct collections Dr. Schour has established that there is a distinct incremental line in the enamel and a corresponding incremental line in the dentin of the crown, the positions of which are characteristic for each type of tooth and correspond with the substance of the enamel and the dentin that was being formed at the time of birth. He was able to demonstrate these lines in 90 per cent of the teeth studied. Because of his conviction that the line is caused by the interruption in calcification at the time of birth, he has appropriately called it the neonatal line. It is possible to demonstrate these lines in the enamel and dentin of some first permanent molars, where they are found at the level of the cusps which were calcified at birth.

The neonatal line can therefore be considered as a permanent biologic landmark which may be used to determine the quality and the amount of the enamel and dentin laid down before and after birth. The demonstration of this important landmark paves the way for further study of the tooth as an index of the metabolic reaction of the individual.

NOYES, Chicago.

COMPLETE CARIES OF ERUPTED PERMANENT DENTITION IN A BOY AGED THIRTEEN YEARS; AGENESIA OF THE ENAMEL. G. T. HANKEY, Proc. Roy. Soc. Med. **29**:1542 (Oct.) 1936.

The patient was admitted to the hospital on account of "anemia, weakness, and jaundice." He was an only child and had never been strong. The teeth were brown when erupted. The intelligence was above normal; the boy was in the top form at school. He tired easily and could not play games. An account of the physical examination, including a full report of the condition of the mouth, with reproductions of x-ray plates of all his teeth, is given in the report. The conclusion drawn is that the dental disease was the primary factor in the boy's illness, which was probably a hereditary agenesia of the enamel. The term "agenesia" is rather misleading, as it means complete absence of the enamel, and in this case there was no such condition, though the structure was faulty. There was no evidence of any general involvement of the skeleton or of the calcium metabolism.

WILLIAMSON, New Orleans.

Miscellaneous

PHENOBARBITAL POISONING. H. W. TAYLOR and M. SCHRAM, Arch. Pediat. **53**:670 (Oct.) 1936.

Taylor and Schram present a case of phenobarbital poisoning in a boy 10 years old. The patient received a total of 61 grains (3.95 Gm.) of the drug over a period of twenty-six days. The noteworthy findings were marked hemorrhagic bullous

and membranous stomatitis, pharyngitis, conjunctivitis, morbilliform dermatitis and bullae containing a clear yellow fluid over the lobes of both ears. There was a decrease in the platelet count to 20,000. In fourteen days the count returned to 300,000.

ORR, Buffalo.

CROSS-INFECTION: ITS PREVENTION IN A CHILDREN'S HOSPITAL. MAURICE L. BLATT, Illinois M. J. **70**:483 (Nov.) 1936.

Blatt outlines and discusses the advantages of the methods of organization and departmentalization which have proved successful in markedly decreasing the incidence of cross-infection in the children's department of the Cook County Hospital.

BARBOUR, Peoria.

THERAPEUTIC USE OF HELIUM. A. L. BARACH, J. A. M. A. **107**:1273 (Oct. 17) 1936.

The use of this gas in the treatment of dyspnea of certain types is based on its decreased specific gravity in relation to nitrogen. Helium in concentrations of 79 per cent mixed with 21 per cent oxygen furnishes a respirable gas mixture similar to that obtained with the same percentages of oxygen and nitrogen. It has a density one third that of oxygen-nitrogen mixture. The helium-oxygen mixture can be breathed with considerably less effort than air or oxygen by patients suffering from obstructive dyspnea. Eighteen cases of severe asthma and twenty-one cases of obstruction in the upper air passages are reported. The mixture was found to act favorably in the asthmatic group, and in many cases patients who had become refractory to epinephrine regained their sensitiveness. The results in cases of obstructive dyspnea were not so favorable, but the necessity for tracheotomy was dispensed with in five cases, and in others considerable relief was obtained before progress of the lesion demanded tracheotomy.

BONAR, Salt Lake City.

A LIVER PREPARATION PROTECTING AGAINST NECROSIS FROM CHLOROFORM OR CARBON TETRACHLORIDE ADMINISTRATION. J. C. FORBES, R. C. NEALE and J. H. SCHERER, J. Pharmacol. & Exper. Therap. **58**:402 (Dec.) 1936.

The authors report the extraction of material from liver which, given subcutaneously, protects the livers of rats from damage by carbon tetrachloride, either by inhalation or by subcutaneous injection, and by chloroform also. In view of the value of carbon tetrachloride in infestation with hookworms and its extensive use in industry, this work may prove to be of great value.

PILCHER, Cleveland.

REPORT OF POISONING BY CICUTA MACULATA. D. R. HAGGERTY and J. A. CONWAY. New York State J. Med. **36**:1511 (Oct. 15) 1936.

A girl of 15 years ate a small piece of the root of Cicuta maculata, the American water hemlock. Thirty minutes later she experienced nausea, vomiting, dizziness and faintness, followed by severe generalized convulsions. Stupor then appeared. After an illness of twenty-four hours she made a good recovery. The treatment was symptomatic. Brief histories are given of six fatal cases of poisoning by water hemlock which have in the last few years been reported to the State Department of Health. This dangerous plant has a wide distribution throughout the eastern states. It is also known as musquash, wild parsnip, water parsnip, snakeweed or cowbane. The fleshy tuberous root is frequently mistaken by children for common garden or Jerusalem artichoke. It has also been mistaken for horseradish.

While there is no specific treatment, it is important that the convulsions be kept under control. Sodium amytal, given intravenously, is recommended.

AIKMAN, Rochester, N. Y.

BLOOD TRANSFUSION IN CHILDHOOD. D. BROWNE, Brit. M. J. **2**:389 (Aug. 22) 1936.

This is a general discussion of the value and the technic of this procedure.

ROYSTER, University, Va.

THE EYNESBURY QUADRUPLETS: FIRST NINE MONTHS OF LIFE. E. H. HARRISSON, Brit. M. J. **2**:917 (Nov. 7) 1936.

Reference is made in this article to the description in the same journal (**2**:1207, 1935) of the birth of these quadruplets. The history of the rearing of the babies is furnished in the present article.

ROYSTER, University, Va.

THE TEST OF ALDRICH AND MCCLURE IN CHILDREN; HELIOTHERAPY. F. MORGANTI, Riv. di clin. pediat. **34**:34 (Jan.) 1936.

The test of Aldrich and McClure was performed on 141 healthy children under 3 years of age. The solution of sodium chloride injected intradermally was absorbed from the skin of 12 of the children in less than thirty minutes, of 102 in between thirty and forty minutes and of 27 in more than forty minutes.

In 17 children sick with various acute infections of the respiratory tract the test of Aldrich and McClure showed absorption in approximately thirty minutes, which increased to about forty minutes with the improvement of the child's condition.

In 15 cases of typhoid or of paratyphoid infection in children between 5 and 10 years of age the time required for absorption varied between twenty and thirty minutes; in one case it was twelve minutes; when these children showed recovery from their illness, the figures approached a more normal value.

Three children with diphtheritic angina showed a normal absorption time; 3 with scarlet fever showed a short absorption period during the febrile part of the disease, while the time increased to from forty to fifty minutes during convalescence. One child with rheumatic fever showed a time of twenty minutes, and several who had nephritis with edema also showed rapid absorption.

In patients with exudative diathesis the absorption time was in general rapid —a mean of thirty minutes.

In 9 hypotrophic children between 2 and 3 years of age the absorption time was between forty-five and fifty minutes. In 6 infants with rickets and anemia slow absorption was also observed—between forty and forty-five minutes.

Heliotherapy did not affect the time of absorption in the Aldrich and McClure test in normal children. However, when heliotherapy was applied to the children convalescing from infectious diseases or with exudative diathesis, the rapid absorption time did not persist, and the reaction to the Aldrich and McClure test became normal. On the other hand, when heliotherapy was given to the hypotrophic or rachitic and anemic children the absorption time fell to normal.

HIGGINS, Boston.

SULFUR THERAPY IN THE NURSLING. M. OPPENHEIM and P. FANTL, Wien. klin. Wchnschr. **49**:107 (Jan. 24) 1936.

Oppenheim and Fanti note that recently toxic effects and even death have been reported as a result of the treatment of scabies in the nursling with sulfur. Nevertheless, they express the belief that ointments containing sulfur are the least poisonous of the preparations used in the treatment of this disease. They experimented with subcutaneous injections of colloidal sulfur, and though subcutaneous and percutaneous applications are not the same, they express the belief that the differences are mainly qualitative. A fine colloidal suspension of sulfur in glycerin and water was used. A rabbit received injections of 7.5 Gm. of the suspension over three days (the total amount of sulfur was 5.6 Gm.). Three hours after the last injection 11 Gm. of blood was removed and examined. Only traces of hydrogen sulfide could be found, and the animal survived the experiment. Over

four days a guinea-pig received injections totaling 2.5 Gm. of sulfur per kilogram of body weight and also survived. Animals seem to tolerate considerable amounts of sulfur without suffering from hydrogen sulfide poisoning. Hence the authors recommend the continued use of ointments containing sulfur in the treatment of scabies in the nursling, especially since no other preparation is entirely nonpoisonous.

ABT, Chicago.

THE PERMEABILITY OF THE PLACENTA FOR VARIOUS MICRO-ORGANISMS AND BACTERIOPHAGES. T. NAKAGAWA, Zentralbl. f. Bakt. (Abt. 1) **136**:147, 1936.

Nakagawa injected various kinds of living bacteria, spirochetes, viruses and bacteriophages into the blood streams of pregnant rabbits and guinea-pigs and later examined the fetuses in order to see when and under what conditions the injected materials appeared in the fetuses and amniotic fluid. He examined 700 pregnant animals and more than 2,000 fetuses. Pathogenic bacteria (streptococci, staphylococci, pneumococci and diphtheria bacilli) passed through the placenta within from two to nine hours; less pathogenic organisms, such as colon, typhoid and dysentery bacilli, went through scantily or not at all. Some bacteriophages passed through, and others did not. The placental permeability did not seem to depend on injuries to it or on pathologic changes but was influenced by such factors as size of bacteria, motility and virulence. In fact, injury to the placenta seemed to delay the passage of bacteria from the maternal blood into the fetus. Nakagawa concludes that placental permeability is correlated with many complicated factors and that the process is not one of simple filtration but rather one of selective filtration.

CANNON, Chicago. [ARCH. PATH.]

Society Transactions

AMERICAN PEDIATRIC SOCIETY

Hot Springs, Va., April 29-May 1, 1937

HENRY F. HELMHOLZ, M.D., *President*

HUGH MCCULLOCH, M.D., *Secretary*

(Continued from page 449)

Fourth Session

Friday Evening, April 30

INFLUENCE OF AIR CONDITIONS ON THE INCIDENCE OF BACILLARY DYSENTERY. DR. GEORGE M. LYON and DR. W. B. HUNTER (by invitation), Huntington, W. Va.

Charts are presented showing the trend of incidence of bacillary dysentery in a county in which it is endemic, for the period 1922-1936. This trend is shown by years, by months and by decades of days. The incidence is compared with the number of days of atmospheric temperature of 90 degrees and above per period of comparison and with the total number of inches of rainfall per period of comparison.

There is no direct relationship between excessively high atmospheric temperature and incidence. In the county in which the observations were made, any summer with an average temperature and with an average rainfall is distinctly favorable to the incidence of dysentery. Excessively high atmospheric temperature influences mortality more directly than it does morbidity. This is shown by the high mortality rates in 1930, 1934 and 1936.

While the relationship between warm seasons and incidence of endemic dysentery is a matter of general appreciation, the nearly as regularly observed secondary rises and falls of incidence within the seasonal curve have never been satisfactorily explained.

Throughout the fifteen year period, when incidence, temperature and rainfall are plotted in ten day periods, there is observed a pattern which occurs, not invariably, but with such remarkable frequency that one is led to believe that it has real significance. Rainfall, normal or above normal, in one decade is generally followed by an increase in incidence in the following decade or decades unless these periods are characterized by excessive rainfall. While this is true with normal or even subnormal atmospheric temperatures, the increase in incidence is even more marked if the two or three decades following are excessively warm and without rainfall. This pattern is particularly apparent in the years 1925, 1927, 1928, 1930, 1932, 1934 and 1936.

The fifteen year period is characterized by an almost record-breaking lack of rainfall for the months and seasons studied. In general, summers which have been excessively warm have not been summers of excessive incidence unless there were interspersed periods of rainfall such as occurred in 1936, the year in which sanitation, parental understanding and generally influential factors were more nearly at an optimum than at any other time during the fifteen years of observation. We believe that our observations show that excessive droughts or excessive rainfall both tend to favor a lower incidence and that periods of rainfall and

periods of excessively high, or above normal, temperatures alternating at the rate of every ten to twenty days provide the maximum aggravating influence among atmospheric conditions.

In the low hilly districts in which dysentery is so characteristically and persistently endemic there is never any wind movement of moment. There may be at night a gentle current from the hilltops, seeking the valleys, but there is none in the day. This lack of wind movement is undoubtedly an important aggravating influence as regards incidence. It is constant and does not vary directly with the intraseasonal fluctuations of incidence.

During the years from 1932 to 1936, inclusive, we made some studies in regard to relative humidity. The most characteristic influence which we have observed in this respect is that represented by the conditions found in the summer of 1934. We employed a factor T $\times$ RH, with T representing temperature in degrees Fahrenheit and RH representing relative humidity in percentage at that temperature. Throughout the twenty-four hour period, at four hour intervals, record was made of temperature and of relative humidity. For each twenty-four hour period, the six products, or factors, were added together to represent a total daily T $\times$ RH factor. When this was done, there appeared to be a definite relationship between this twenty-four hour factor and incidence. From June 20 to Aug. 1, 1934, a seasonal period in which dysentery is generally common in this county, this twenty-four hour T $\times$ RH factor averaged approximately 18,000, and from Aug. 1 to Sept. 10, 1934, 36,000. During the former period the incidence averaged 3.5 cases per decade as opposed to 9 for the latter period. We did not employ this method until 1932. With appropriate testing, this factor has been observed with frequency in shorter periods of time during the last five years of the study, and while we cannot say that there is invariably a direct relationship, yet it is undoubtedly close enough to be of significance. This is in general agreement with some of the findings in a survey of enteritis conducted under the auspices of the Federation of Public Health in Cincinnati for the years 1934 and 1935.

There are many technical difficulties which attend a study of air conditions in regard to the incidence of bacillary dysentery or any other specific infectious disease. Such a simple thing as atmospheric temperature varies tremendously within a given community. The same is equally true in regard to relative humidity. Data of the United States Weather Bureau can be used only to a limited extent. Such data cover only very general conditions. We do not have at the present time adequate technic for accurately studying air conditions in regard to the incidence of bacillary dysentery.

We have attempted to study in a simple way the influence of atmospheric temperature, rainfall and atmospheric humidity on the incidence of bacillary dysentery.

It is our belief that atmospheric conditions influence the incidence of bacillary dysentery almost entirely through their influence on flies. Excessive droughts, persistent excessive rainfall and marked air movement all affect flies adversely and are accompanied by a low incidence of dysentery. Alternating periods of normal rainfall and normal summer temperature with persistent humidity and lack of wind movement favor an enormous increase in the number of flies and are accompanied as well by a high incidence of dysentery. The existence of the dysentery bacillus outside the body of the host is undoubtedly favored by these same conditions, but this is distinctly of secondary importance as compared with the influence on the all important vector, the fly.

DISCUSSION

DR. LAWRENCE T. ROYSTER, University, Va.: There are some interesting points to be brought out relative to this paper presented by Dr. Lyon. Having had a reasonably extensive experience with this class of diseases, I at least have some impressions.

First of all, I wish to draw attention to the impression that the reported cases of this disease are far in the minority as compared with the unreported cases.

In the second place, I practiced for a great many years in Norfolk, Va., near the seacoast, and more recently in the mountain section, the foothills. In fourteen years at the University of Virginia, I have encountered but a single case of dysentery in private practice.

There has always been a seasonal incidence, and I am quite sure there is yet that seasonal incidence. It is sometimes varied in a way which I have not been able in my own mind to work out or even form a reasonable impression of.

When I was living on the seacoast at Norfolk, there was almost always a hot humid period in the early part of May. Then the incidence of diarrhea began. Thereafter there was what is called the long rainy spell on the seacoast, the last two weeks of May, when the incidence of diarrhea diminished materially. As soon as the hot days of June came, the incidence increased tremendously.

In a study made a great many years ago over the whole United States, largely by correspondence with weather bureaus and physicians, I found that diarrhea, whether bloody or nonbloody (for the moment it makes no difference), was very rare in the plateau regions from the Mississippi to the Rocky Mountains. I have been told by some of my clinical friends that in later years there has been a relatively large incidence of diarrhea. I do not know why this is true. I take it there has been a definite connection between the incidence of diarrhea and the heat and humidity. However, that remains to be proved.

My associates and I at the University of Virginia have observed that there was a rather striking relationship between the number of flies and the incidence of disease of this type. Dr. Waddell and I have been studying this for several years. Last summer there were no flies worth speaking of in our vicinity during the hot months. When September and October came with relatively cooler atmosphere, the number of flies increased and with this the incidence of diarrhea.

Now, in connection with diarrhea, there are two distinct types clinically, the hemorrhagic and the nonhemorrhagic. The hemorrhagic almost always has pus and blood as well as mucus. It has a very definite period of duration. I should say twenty-one days as a fair average. The nonbloody type has no period of duration, and yet Dr. Maxcy, to whom reference has been made, studied the cases with us and found that the two groups were bacteriologically practically the same.

Some years ago, when I was directing the King's Daughters' Clinic in Norfolk, every day I went into the waiting-room and instructed the mothers to screen their houses, boil the milk, boil the water and take care of the feces. In five years there was not a child with diarrhea among those who were regular attendants on that clinic. Whether that had anything to do with it, I do not know.

Whereas in Boston some years ago there was a floating hospital with wards assigned to the distinct group, today such wards are practically closed, and in the last year or two I believe the situation in New York is similar. The situation in Virginia has not yet reached this point. We are still having to deal with diarrhea, but usually in the later months of summer and the early months of fall. At the present moment, I feel, after studying this subject for thirty odd years, that I am still unimpressed with what it is all about.

DR. J. H. MASON KNOX JR., Baltimore: I think the members are under obligation to Dr. Lyon for this report. My interest in the subject dates back more than a third of a century, because it was in the Thomas Wilson Sanitarium that the dysentery bacillus was first found to be associated with the so-called summer diarrhea of infants.

The studies of Dr. G. Foard McGinnes, Dr. Kenneth F. Maxcy and co-workers in Virginia and recently near the Mexican border showed, in a large percentage of the cases of dysentery in infants, a house infection, i. e., a previous case or cases in adults or older children in the home, and often a large incidence of flies.

The first report made at the Thomas Wilson Sanitarium in 1902 concerned a clinical and bacteriologic study of a series of cases of diarrhea among infants. We found that in several of these cases in which the findings were positive for dysentery bacteriologically the diarrhea had not been associated with any blood in the stools, and I believe, as Dr. Lyon said, that the incidence of dysentery is

much larger than is usually thought by those who depend for diagnosis on blood and pus in the stools. I am of the opinion that there are many cases of mild gastro-enteritis due to infection with dysentery bacilli in which the condition cannot be distinguished clinically from diarrhea of other origins.

Reports have been made to the state health department in Maryland of many cases of diarrhea occurring in infants. In over 100 such cases it was shown that the children were fed on pasteurized milk of excellent quality. On further investigation their homes showed flies and very frequently diarrhea in adults in the family. The dysentery bacilli may reach infants through contact, direct or indirect, with other persons in the home who have mild dysentery. The organism is closely related to the typhoid group and is disseminated in a similar manner.

In regard to the temperature, my co-workers and I made a study years ago in Baltimore similar to that made by Dr. Lyon in Huntington, obtaining a record of the temperatures by placing thermometers in the homes of the children. We were not able to make out any definite association between the temperature of the home and the incidence of the disease, but again in cases in which children became ill with diarrheal disease the presence of flies was noted.

Dr. Frank C. Neff, Kansas City, Mo.: I should like to say a word about the relation of Dr. Lyon's subject to the handling of patients with dysentery in the hospital. Dysentery brought into the hospital introduces a great danger for other children. It is a menace that cannot be disregarded.

There was an epidemic of the disease in the Middle West this last fall (1936), and introduction of patients with dysentery into the Children's Hospital, where always there are patients with diarrhea, requires that the personnel of the hospital determine the true nature of the disease. Certainly it spreads in many ways, and I think Dr. Lyon's suggestion might apply even to institutional spread.

This last year a well trained graduate nurse was employed by the hospital to take care of several dysenteric infants. She observed all the precautions as to isolation and the care of hands and food. This nurse, at about the time the epidemic ended, herself presented dysentery and died in the hospital. Autopsy as well as culture of the stools proved the nature of the disease.

Dr. George M. Lyon, Huntington, W. Va.: We feel that the climatic conditions affect the incidence of bacillary dysentery only as they affect the number of flies and the life cycle of the fly.

As indicated previously in the paper, data from the United States Weather Bureau are not sufficiently individualized as to the variations of climatic factors within a given community. There are remarkable differences in temperature, rainfall, humidity and wind movement within the same small community. Man-made shelters, such as houses, barns and outhouses, present still other disturbing factors through their alteration of air conditions. These may in turn be extremely important in providing suitable protection for fly breeding.

There is need for stimulating interest in the development of better methods for studying atmospheric conditions in regard to the incidence of specific infectious diseases. With the various indirect methods that have been employed by Huntington, Palmer and others, only general influences are noted, and these are by no means helpful in ascertaining the specific influences of atmospheric conditions on the incidence of bacillary dysentery as we know the disease.

This society heard something of our school health program two years ago. I have a slide here of a chart which goes into the home of every school child in our county. It emphasizes the importance of insanitary disposal of sewage in relation to "bloody diarrhea." The studies in Henrico County tend to emphasize further the danger of the exposed soiled diaper.

Treatment of Meningococcic Meningitis with Sulfanilamide. Dr. Francis F. Schwentker (by invitation), Baltimore.

Sulfanilamide (para-aminobenzene sulfonamide) has been found effective in the treatment of meningococcic meningitis. It is administered in 0.8 per cent concentration in normal saline solution, both subcutaneously and intrathecally, the

methods of administration being very similar to those used when serum is administered. No serum was used in the treatment of any of the patients. The results have shown that the drug is as effective as polyvalent antimeningococcus serum. The spinal fluid becomes sterile promptly after the institution of treatment, and the spinal fluid cell count falls progressively. No untoward symptoms have been noted in any of the patients treated. The severity of the disease in patients treated with sulfanilamide ranged from very mild to very severe. Up to the present time no deaths have occurred in this series, although the number is as yet too few for one to draw statistical conclusions. I am convinced that sulfanilamide will be a valuable adjunct to polyvalent antimeningococcus serum in the treatment of meningococcic infections and may even replace the latter entirely.

DISCUSSION

DR. KENNETH D. BLACKFAN, Boston: My experience with this form of therapy has been limited, but I feel that I can agree with Dr. Schwentker as to its effectiveness in meningococcic meningitis.

It was the experience of Dr. Marshall, if I am correct, that, when sulfanilamide was given by mouth, the concentration in the blood reached its height in three or four hours, and likewise an almost comparable concentration in the spinal fluid. Therefore, when my associates and I had the occasion we treated a patient by mouth and subcutaneously with sulfanilamide, without intrathecal injection. Two other patients were observed in whom the organisms disappeared promptly from the spinal fluid, and there was likewise remarkable clinical improvement.

I am wondering whether Dr. Schwentker will say something about the possible effect of the use of this form of therapy without intrathecal injection.

The third patient with whom we had experience was a young infant who failed to respond to the antimeningococcus serum, which was potent against the infecting organism, and after ten days of experimentation with the serum without its clearing the meningococci from the spinal fluid, effective doses of a derivative of sulfanilamide, prontosil soluble (the disodium salt of 4′-sulfamidophenyl-2-azo-7-acetylamino-1-hydroxynaphthalene-3, 6-disulfonic acid), were given. The organisms disappeared, and yet the duration of time had been sufficient for the child to acquire hydrocephalus and die a death of the unusual hyperpraxic type which one sees with cerebral damage. At necropsy we were unable to recover organisms directly from the ventricular or spinal subarachnoid spaces.

DR. JOHN D. LYTTLE, New York: A 5 year old child with scarlet fever who received this drug for five days, a total of 5 Gm., showed a gratifying drop in temperature and improvement in the clinical condition. There was no septic complication, such as adenitis or arthritis, or infection of the blood stream. At the end of four days of therapy, severe hemolytic anemia developed with jaundice and hemoglobinuria. There was no history of blood dyscrasia. I should like to ask Dr. Schwentker whether he has seen hemolytic anemia as a result of this therapy.

DR. FRANCIS F. SCHWENTKER, Baltimore: My co-workers and I have administered sulfanilamide by mouth in only a few patients, very much as Dr. Blackfan has described. We have had the idea that the results were not quite as satisfactory and that the recovery was not quite as prompt as when the drug was given intraspinally. As long as one is going to do spinal punctures to examine the fluid, there seems to be no definite reason why the drug should not be given intraspinally, once the needle is in place. Furthermore, I think the lantern slide showed definitely that the concentration of the drug in the spinal fluid is very much higher if sulfanilamide is given intraspinally than if it is given by mouth alone. However, our patients who received the drug only by the oral route have improved, and only further work will tell whether the intraspinal injection is necessary.

In line with what Dr. Blackfan has said, I should like to add that every patient who died following treatment with sulfanilamide had sterile spinal fluid

at the time of death and died of the results of the meningitis rather than of the infection itself. The sulfanilamide seems to be adequate in combating the infection although not always in saving the patient.

Among the group who received sulfanilamide were a number in whom sulfemoglobinemia developed. One had the typical sulfanilamide rash. None had anemia. We have used the drug in a large variety of cases and especially in cases of scarlet fever, and up to date no patient in our hospital has shown hemolytic anemia. Three patients with hemolytic anemia apparently due to sulfanilamide have, however, been observed in Baltimore. We have observed no change in the leukocytes which we could say was attributable to sulfanilamide.

In general, we must recognize the complications that occur with sulfanilamide therapy. They are definite complications, and for that reason the drug should be used not promiscuously but only by those who recognize that these complications occur. On the other hand, the complications observed were never of a dangerous quality if they were recognized and appropriate treatment instituted.

Dr. Kenneth D. Blackfan, Boston: I am sure Dr. Schwentker feels, as my colleagues and I do, that until there is more accurate information as to the potential dangers and the correct dosage of this drug, it is advisable to control the use of the drug by determining the concentration in the blood and spinal fluid, particularly in the meningitic forms. This can be done according to Dr. Marshall's test. I do not know whether Dr. Schwentker does that, but it seems to me that it is important until more is known about the use of this new form of treatment.

Dr. Francis F. Schwentker, Baltimore: I quite agree with Dr. Blackfan. My associates and I make analyses of the blood and spinal fluid of every patient who receives sulfanilamide and regulate our dosage according to the concentration of the drug in the tissue fluid.

Immunization Against Human Influenza. Dr. Joseph Stokes Jr., Dr. Aims C. McGuinness (by invitation), Dr. Paul H. Langner (by invitation) and Dr. Dorothy R. Shaw (by invitation), Philadelphia.

Studies previously reported (Stokes, Joseph Jr.; Chenoweth, Alice D.; Waltz, Arthur D.; Gladen, Ralph G., and Shaw, Dorothy R.: Results of Immunization by Means of Active Virus of Human Influenza, *J. Clin. Investigation* **16**:237 [March] 1937) suggested that the intramuscular injection of the active virus of human influenza in the face of an oncoming epidemic of the disease may protect the person treated in a large number of the cases. Three febrile respiratory infections occurred among those receiving treatment with human virus, an incidence of 2.7 per cent; 17 cases occurred among those given injections of swine virus, an incidence of 14.5 per cent, and 69 cases occurred in the control group, an incidence of 14.4 per cent. The presence of the active virus as a probable causative agent during the epidemic was determined by the appearance in the serums of children of the epidemic area around the institution, during convalescence, of neutralizing properties against the virus, whereas such neutralizing properties had been absent during the height of their disease.

During the fall and early winter of 1936, of about 5,000 inmates in six institutions, one-third were vaccinated with the active human influenza virus in tissue culture. Vaccine from chick embryo tissue cultures was found to be more satisfactory than Berkefeld filtrates of virus-infected mouse lung, used in the previous study. Three or four intramuscular injections of 2 cc. were given at weekly intervals, and no respiratory diseases were noted either in the vaccinated or in the unvaccinated persons as a result of the injections. While no epidemics occurred in four of the institutions, in one of approximately 800 inmates an influenza epidemic began thirty-six days after the last injection, and in another of approximately 560 inmates an influenza epidemic began a little over two months after the last injection. Viruses similar to the P. R. 8 virus of Francis were recovered from patients in both epidemics by passage, first through ferrets and later in mice.

In the first institution, during the epidemic, Jan. 20 to March 1, 1937, 95 febrile respiratory infections, or 18 per cent, occurred in the unvaccinated group, while 16 such infections, or 5.8 per cent, occurred in the vaccinated group. In the unvaccinated group the total number of days of fever was three hundred and eleven, or 0.59 day per unvaccinated person, whereas in the vaccinated group the total number was 37, or 0.13 day per vaccinated person.

In the second institution, during the epidemic, Feb. 1 to March 13, 1937, 42 febrile respiratory infections, or 11.8 per cent, occurred in the unvaccinated group, while 13 such infections, or 6.7 per cent, occurred in the vaccinated group. In the unvaccinated group the total number of days of fever was one hundred and twelve, or 0.31 day per unvaccinated subject, whereas in the vaccinated group the total number was 36, or 0.19 day per vaccinated subject. Also in this institution, of the patients with temperatures of 102 F. or over, 26 were in the unvaccinated group and 2 in the vaccinated group, the only significant difference between the groups.

The protective value of intramuscular vaccination with active human influenza virus in these three epidemics appeared to vary inversely with the length of time between the final injection of vaccine and the onset of the epidemic. While such vaccination appears to be of considerable value, other factors must receive further study before proper criteria can be developed for the type and method of vaccination.

CUTANEOUS INFECTION IN EXPERIMENTAL POLIOMYELITIS: NEUROSURGICAL STUDIES. DR. WILLIAM H. GERMAN (by invitation), DR. JOHN R. PAUL (by invitation) and DR. JAMES D. TRASK, New Haven, Conn.

A certain strain of the virus of poliomyelitis was found to produce infection with considerable regularity when inoculated intracutaneously in monkeys.

An attempt was made to learn the pathway of infection following the intracutaneous inoculation of this strain. Animals were prepared by carrying out rhizotomy, laminectomy, olfactory neurectomy and the establishment of denervated flaps of skin. The incidence of infection following intracutaneous inoculation was not reduced by any of these surgical procedures.

These findings cast doubt on the absolute neurotropism of this strain of the virus.

DISCUSSION

DR. HAROLD K. FABER, San Francisco: These extremely interesting experiments are difficult to understand on the basis of what one has come to believe in recent years, that the virus of poliomyelitis is always nerve conducted.

The question whether this virus is neurotropic, however, is answered by the experiments, since in these animals nervous symptoms obviously developed and the diagnosis of poliomyelitis was made in the usual way by the effects of infection on the central nervous system alone. No lesions outside the central nervous system have been described. The virus is apparently as neurotropic as other strains but has presumably been conducted to the central nervous system under the conditions of these experiments in another way than by the axons.

Experimentally infections have been produced by way of the blood stream, and probably that is the manner in which the infection in these experiments reached the central nervous system. I was glad to hear the details of the technic, because it is an extremely difficult matter to sever all sympathetic nerve connections from a flap of skin, no matter how careful the technic is. It seems to me it must be necessary to strip every small arteriole leading to the area of skin in question. The experiments on the leg are somewhat more convincing. The possibility of nerve regeneration after operation and before injection of the virus must be taken into account in all the experiments; if regeneration had occurred, axonal transmission would still be possible.

DR. JOHN A. TOOMEY, Cleveland: These experiments are important because they tend to show that the experimental animal may be infected by a route other than that of the axis-cylinder.

In recent experiments I have been able to show that the difference between white-fibered nerve tissue, which is very difficult to infect, and gray-fibered nerve tissue, which is easy to infect, is in the amount of the cholesterol content. I have been able to show that virus can be adsorbed out of solution by ordinary cholesterol. This conclusion applies to any strain of virus. If white fibers have a higher cholesterol content than gray fibers, it is evident how important this fact might become.

These results are applicable to the experiments just described because, when nerves are sectioned as Dr. Trask and his associates sectioned them, the nerve peripheral to the section is destroyed, and the fat concentrated in the myelin changes, becoming nonabsorbent, so that it does not take up virus. After Dr. Trask sectioned the nerves, there remained a gray-fibered connection from the periphery to the central nervous system along collateral sympathetic chains. If there is a gray-fibered connection from the periphery to the central nervous system with which the virus may come in contact the spread will be easier if there is no myelin or if the myelin has changed its character so that there will be no absorption, adsorption or destruction of the virus on the way to the central nervous system.

So when certain nerves of the central nervous system are cut, a connection still remains, and it has been made easier for the virus to travel to the central nervous system, since the adsorbing factor has been destroyed. Thus these experiments do not vitiate the theory—that the virus spreads along the axis-cylinder.

I agree with Dr. Faber that there is a possibility that there will be some nerve fibers, especially those of the blood vessels, remaining. The latter fibers have a direct connection from the periphery to the intermediolateral cell column of the cord.

Dr. James D. Trask, New Haven, Conn.: I am not quite certain whether Dr. Faber and Dr. Toomey think all the nerves in the skin flap were cut. They certainly were all cut. Dr. German prepared the skin flap in two stages. First he cut half of the flap and placed silk sutures across the wound for a landmark. Two weeks later he completed the second stage of the operation by cutting everything up to the landmark and removing it. Thus all nerves to the inoculated area were cut.

Localization of Lesions of Poliomyelitis as Visualized by Intravital Staining. Dr. Harold K. Faber, San Francisco.

This study supplements a previous one on the progression of poliomyelitic infection through the central nerve tissues during the preparalytic period of invasion, in monkeys inoculated intranasally. By recovering virus on successive days after inoculation it had been found that the olfactory bulb and brain stem were invaded by virus some days before the spinal cord.

By intravital staining with trypan blue, it has been possible to show the localization of reactions to the presence of the virus during the period of invasion and before paralysis. Colored lantern slides will be exhibited.

The earliest and possibly doubtful reactions, small and slight, are found on the third day after inoculation, in the thalamus and subthalamic region. On the fourth day they are extensive and severe, involving the olfactory bulb, interbrain, midbrain, pons and medulla but not the spinal cord. On the sixth day the cord is definitely involved but more heavily at the cervical than at the thoracic and lumbar levels. On the seventh day the changes are similar to those of the sixth. On both days the brain stem is heavily stained, with special intensity in the thalamus, midbrain, pons and medulla. Reactions in the cerebral cortex are few and scattered in all specimens but most constantly in the hippocampus (olfactory center).

In general, the experiments show a constant reaction, rather explosive in onset, beginning about the fourth day after infection, localized in the brain stem and preceding invasion of the spinal cord. The possibility is considered that such a regional encephalitis—corresponding closely in distribution with lesions

found post mortem in acute poliomyelitis in man—also begins in human beings during the preparalytic period as well as in patients in whom the disease is nonparalytic and is responsible for certain common early symptoms of the disease.

DISCUSSION

DR. JAMES D. TRASK, New Haven, Conn.: Has Dr. Faber been able to corroborate the statement of Sabin and Olitsky that monkeys inoculated intranasally show quite regularly histologic changes in the olfactory bulb?

DR. JOHN A. TOOMEY, Cleveland: I should like to ask Dr. Faber if he is familiar with Terpe's experience in Rumania. In Terpe's thirteen cases, at autopsy there were only destruction and marked neuronophagia of the cord cells and often no vascular change whatever.

In reading Dr. Faber's original article in the *Proceedings* I wondered why, if virus could be demonstrated in the olfactory area, its presence was not always associated with the type of change which he describes in the cord.

Would Dr. Faber concede that the virus might have merely an obligate affinity for gray fibers, that in itself it could be considered a foreign body sufficient to cause perivascular dilatation as it spreads down the cord and that the reaction described here might be totally different from that associated with the ultimate disease?

DR. HAROLD K. FABER, San Francisco: I have not been able to confirm the experiments of Sabin and Olitsky entirely. I have examined many olfactory bulbs, and in some of them there seems to be extraordinarily little change. I have not always examined both bulbs and may sometimes have got the wrong bulb, but it happened a number of times that I did not find any striking changes. Sometimes there were.

The olfactory bulb is a very cellular organ, and the so-called granular cells, which are many, might be, I think, mistaken sometimes for invading cells—lymphocytes and so forth. I feel that the experimental tracing of the virus into the olfactory bulb is so well substantiated that the demonstration of pathologic change in itself is of secondary importance. The olfactory bulb is quite uniformly and constantly the seat of virus before the latter gets into the brain stem and farther along.

I have not had an opportunity to study the olfactory bulbs in human beings. That is something which should be done on a larger scale than has been done heretofore. I have shown the vascular changes to be the chief basis for the early staining in these tissues, and I believe these changes may be transitory. The brain stem appears to be only temporarily infected in many instances. Harbitz and Scheel many years ago studied material from patients who died a few weeks after recovering from acute poliomyelitis and found that while the changes in the cord were still present and marked the changes in the brain stem were slight or absent, in marked contrast with the state of tissues in patients who died during the acute stage itself. It is therefore probable that nerve cells may be infected slightly and temporarily in poliomyelitis and that the vast majority of them recover in every patient who recovers from the disease.

In reference to Dr. Toomey's question, I am not quite clear as to what he means. I have been wondering for a long time what he implies by "obligate affinity for gray fibers." The virus spreads through myelinated fibers quite as well as it does through unmyelinated fibers because it passes through the axis-cylinder. Whether or not there is a myelin sheath around the axis-cylinder seems to me to be rather unimportant.

DR. JOHN A. TOOMEY, Cleveland: Did Dr. Faber ever induce the disease in monkeys by injecting the virus into a peripheral myelinated nerve where he had not irritated the fibers previous to the injection?

DR. HAROLD K. FABER, San Francisco: I do not know how that would be possible.

ACUTE LARYNGOTRACHEOBRONCHITIS. DR. JOSEPH BRENNEMANN, DR. WILLIE MAE CLIFTON (by invitation), DR. ALBERT FRANK (by invitation) and DR. PAUL HOLINGER (by invitation), Chicago.

This article will be published in full, with the discussion, in a later issue of the AMERICAN JOURNAL OF DISEASES OF CHILDREN.

Final Session

Saturday Morning, May 1

THE INFLUENCE OF VITAMIN C ON DIPHTHERIA TOXIN. DR. JEAN PAKTER (by invitation) and DR. BÉLA SCHICK, New York.

This article will be published in full, with the discussion, in a later issue of the AMERICAN JOURNAL OF DISEASES OF CHILDREN.

CEVITAMIC ACID CONTENT OF THE BLOOD PLASMA. DR. ARTHUR F. ABT (by invitation) and CHESTER J. FARMER, PH.D. (by invitation), Chicago.

It is generally agreed that cevitamic acid exists in the blood plasma in the reduced form. In the data reported here, all values given are, therefore, for reduced cevitamic acid. Plasma from freshly drawn oxalated blood is immediately deproteinized by the use of metaphosphoric acid, and, as we have previously shown, following this deproteinization the cevitamic acid in the filtrate is relatively stable. Thus we feel that our values represent the concentration of reduced cevitamic acid in the circulating plasma.

By the use of a microchemical method which we have devised for the determination of the reduced cevitamic acid content of the blood plasma, we have made determinations in a series of normal children and in infants and guinea-pigs suffering from scurvy. In infants and children on diets containing adequate vitamin C the fasting blood plasma levels for cevitamic acid showed no correlation with age but varied directly with the intake of vitamin C. The lowest blood plasma values for our human subjects were obtained for infants suffering from active scurvy. The blood plasma levels for guinea-pigs dropped when the animals were placed on a scorbutic diet, and the lowest values were obtained for the guinea-pigs in a state of active scurvy.

Blood plasma values obtained for infants recovering from scurvy showed a rapid rise and were more informative than single or twenty-four hour determinations of the cevitamic acid in the urine. With the aid of the micromethod described, tolerance tests may be made in which the cevitamic acid in the blood is determined hourly, and curves may be plotted. There is a difference in the curve so obtained for a patient who was previously on a low or high vitamin C intake. As this patient continues on a high intake of vitamin C, the successive fasting blood levels attain higher values. Tolerance tests performed by the oral administration of 10 mg. of cevitamic acid per kilogram of body weight show higher values at the peak of reduced cevitamic acid in the plasma; the peak usually occurs at the third hour, and the rise (the difference between the initial fasting level and the value attained at the peak) is increased.

We conclude that the cevitamic acid (reduced) content of the blood plasma varies directly with the vitamin C content of the previous diet.

DISCUSSION

DR. FRANCIS SCOTT SMYTH, San Francisco: I should like to ask Dr. Abt if he has noted any variations with infection. Some of the results which my co-workers and I have obtained in studying the blood content have led us to suppose that there is no threshold phenomenon for urinary excretion of cevitamic acid in the presence of infection in all cases. I wonder if certain types of infection particularly could alter the picture, or has he data on that? In some instances, large amounts of cevitamic acid have been given intravenously when the blood level was low. Instead of retention and ultimate elevation of the blood level there has been a persistent profound loss by way of the kidney.

DR. SAMUEL W. CLAUSEN, Rochester, N. Y.: I should like to inquire whether a difference was observed between the venous and the arterial blood of the umbilical cord. If such a difference exists, it might indicate that cevitamic acid passes into the fetus and is used by it.

DR. ARTHUR F. ABT, Chicago: We are just beginning to study the blood values in the various infectious diseases. We are also studying the effect of variations in blood plasma values in patients in whom artificial fever has been induced, to determine the effects of fever without infection. The blood of the umbilical cord was simply mixed blood. We did not attempt to differentiate between venous and arterial blood.

EFFECT OF THE VITAMIN B INTAKE ON RETENTION OF IRON IN A NORMAL INFANT.
DR. FREDERIC W. SCHLUTZ and HELEN OLDHAM, M.S. (by invitation), Chicago.

In a previous study of the retention of iron in a normal child, it was noticed that lowered values for such retention were coincident with the addition of a stabilized wheat germ product to the diet. The same effect had been observed in an anemic infant when a concentrate of wheat germ was added to the diet. The amount fed was not excessive in either case, and neither the frequency nor the consistency of the stools was affected.

To determine whether or not these lowered values were due to the addition of vitamin B in the wheat germ products, the retention of iron in a normal infant has been studied at different levels of iron intake, both with and without additional vitamin B in the crystalline form.

The infant was 6 months of age when the study was started. After a fore period of five days on a normal diet, consisting of powdered milk, cane sugar, cereal, orange juice and cod liver oil, strained vegetables, ferric pyrophosphate and cupric sulfate, collections of both urine and feces were made for three periods of six days each, with intervals of from two to three days between periods.

The diet of the first three periods was then supplemented with vitamin B in the crystalline form, and collections were again made for three periods of six days each.

Next a continuous study was made of the retention of iron for ten periods of three days each. The continuous collections were made possible by using a nursery chair with a specially constructed harness for the collection of feces. The collection of urine was discontinued, since the output of iron in the urine was negligible.

The basal diet in the first half of this series was similar to that of the first three periods except for the addition of strained fruit. The amount of ferric pyrophosphate was increased, and the intake of iron was raised appreciably.

In the second half, the child received this same diet supplemented with crystalline vitamin B.

The control diets were assayed for their vitamin B content, and the amounts of crystalline vitamin B added were those which would raise the total daily intake of the vitamin to approximately 20 international units per kilogram.

In the young infant, the average retention on the basal diet and iron alone was slightly higher than that observed when vitamin B was added. Small positive retentions were always observed on the normal diet alone, and small negative retentions on the same diet when the vitamin was added.

As the child grew older, the average retention on the basal diet and iron alone also was found higher than when vitamin B was added to the diet.

It seems, then, that additional vitamin B, when included in the diet of this infant, never caused an increase, and often caused a decrease, in the retention of iron.

Another factor that appeared to have a depressing effect on the retention of iron was slight alterations in the amount of food contained in the basal diet.

The retentions found on the higher intakes were definitely more positive than those on the lower intakes of iron.

DISCUSSION

DR. KENNETH D. BLACKFAN, Boston: I should like to ask Dr. Schlutz what fraction of vitamin B he is working on.

DR. FREDERIC W. SCHLUTZ, Chicago: In answer to Dr. Blackfan's question as to the fraction of vitamin B, it is a composite of fractions. We have made no attempt to work with any separate fraction, as is done in the Wisconsin school. The composite fraction used presumably contains all the fractions from one to four and possibly up to six.

COMPARATIVE VALUE OF SPINACH AND TOMATOES IN THE CHILD'S DIET. DR. FREDERICK F. TISDALL, DR. T. G. H. DRAKE (by invitation), DR. P. SUMMERFELDT (by invitation) and S. H. JACKSON, PH.D. (by invitation) Toronto, Canada.

Spinach has long been regarded by not only the population in general but by physicians as a particularly valuable food in the diet of infants and children. This belief has been based largely on the high content of iron, calcium and vitamins in spinach in the raw state. To obtain further information a study was made of the nutritional value of spinach as prepared for consumption, and for comparison similar studies were made on the almost universally available canned tomato.

The total iron content of cooked spinach is more than three times that of canned tomatoes. However, the amount of soluble iron, which is apparently the amount available for nutritional purposes, is approximately the same in both vegetables. The hemoglobin-regenerating power of cooked spinach and tomatoes, determined biologically on anemic rats, showed these vegetables to be of approximately equal value as a source of iron for the cure of nutritional anemia. The calcium content of cooked spinach is approximately twenty times that of canned tomatoes. However, when animals fed a diet low in calcium were given, in addition, cooked spinach and cooked tomatoes, it was found that the spinach tended to produce a negative calcium balance. On the other hand, the retention of the calcium from cooked tomatoes was excellent.

The vitamin A contained in cooked spinach is approximately four times as great as that in canned tomatoes. The vitamin B_1 contained in cooked spinach is approximately one half that in cooked tomatoes. The vitamin C contained in cooked spinach is less than one quarter of that in canned tomatoes. The vitamin D contained in cooked spinach and canned tomatoes is negligible; it would require several hundred servings of either to furnish the amount of vitamin D in 1 teaspoonful of cod liver oil.

A very appreciable loss of many of the food elements of spinach may occur in the discarded cooking water even when the cooking is carried out under ideal home conditions. If these conditions are not observed the loss may be greatly accentuated. On the other hand, in the preparation of tomatoes for consumption, no water is discarded.

The results obtained indicate that the nutritional value of spinach has been markedly over-rated. On the other hand, because of their nutritional value, canned tomatoes merit more frequent employment in the diets of infants and children.

DISCUSSION

DR. FREDERIC W. SCHLUTZ, Chicago: I am afraid the case for spinach looks very bad. In studies made some years ago, my associates and I found that infants suffering from anemia had better retention of iron on raw spinach than on cooked spinach and particularly poor retention on dried spinach. I refer to the dried spinach furnished by commercial concerns. It appears that for infants, at least, it is not a particularly valuable adjunct to the diet. Infants can be given spinach in raw form, but I believe it seldom is given that way. I cannot quite subscribe to the hate of spinach Dr. Tisdall referred to. He may be overlooking some of its good values.

DR. CHARLES HENDEE SMITH, New York: Dr. Tisdall did not touch on the allergic effect of these foods. Dr. Robert Cooke, of New York City, a pioneer in allergy, has said (I think I quote him correctly) that he does not consider spinach fit for anybody to eat because he has found so many persons sensitive to it.

DIETARY PROTEIN AND REGENERATION OF SERUM ALBUMIN. DR. A. ASHLEY WEECH and DR. ALVIRA GOETTSCH (by invitation), New York.

The experiments deal with a method of assaying food proteins with respect to their potency in promoting the synthesis of serum albumin. Depletion of the serum albumin is produced in dogs by maintenance for three weeks on a basal low protein diet. The food protein is then incorporated in the diet at a 12.5 per cent energy level, and the regeneration of albumin during the ensuing week is measured. The response of individual animals to the same diet varies considerably; 5 experiments in which liver was the source of food protein yielded the following potency values in terms of the rise in grams of albumin per hundred cubic centimeters of serum: 0.21, 0.51, 0.55, 0.68, 0.75. It follows that a large number of assays must be run with each food protein before an accurate average potency value can be assigned. The potency values for several food proteins and the number of experiments in which each was tested (given in parenthesis) are as follows: beef, 0.84 (2); egg white, 0.68 (2); salmon, 0.61 (2); liver, 0.54 (5); soy bean, 0.46 (2); casein, 0.43 (9); gelatin, 0.00 (4). Since the number of experiments is small, the values are to be regarded as tentative.

In 14 experiments the test protein was fed at a 24 per cent energy level. In 6 of these experiments, which included 4 food proteins, there was a maximum degree of regeneration; that is, the albumin loss of the preceding three weeks was entirely restored. The average regeneration in 5 experiments with casein was 0.99 Gm. per cent. Although such data are not suitable for evaluating the relative potency of different foods, they serve to stress the quantitative factor in protein intake in securing adequate regeneration of serum albumin.

DISCUSSION

DR. L. EMMETT HOLT JR., Baltimore: I should like to say a good word for gelatin. I feel sorry for gelatin at the bottom of Dr. Weech's list, having no virtues at all. But gelatin, because of its high content of amino-acetic acid, does have a distinct value in conjugation reactions, which is not equaled by other proteins which are lower in amino-acetic acid.

DR. GLENN E. CULLEN, Cincinnati: I should like to make two comments, not in regard to the evidence of regeneration of serum albumin, because that is so beautifully demonstrated, but because this work, as well as other work presented before this meeting, will undoubtedly stimulate many of those present toward more intensive study of serum albumin. In such studies one should remember two important facts:

The first is that there is a great tendency, especially in clinical laboratories, to pay attention to the albumin-globulin ratio rather than to the level of albumin in the serum. It does not take much infection to so increase the globulin that the albumin-globulin ratio is distorted, but variations in the albumin level are of great importance in regard to nutrition and edema.

The second fact relates to the technic of determining the serum albumin. My colleague Dr. Robinson, in the laboratory, after a great deal of effort, has run down the factor that is responsible for the great variation in values for serum albumin as reported from different laboratories. He presented this work before the American Society of Biological Chemists at Memphis last month, and from the discussion there I am sure that his modification of technic will be accepted as much more satisfactory than anything previously known. The modification is quite simple. If one is to compare values from different institutions, the institutions must adopt uniform analytic procedures, which give comparable results.

DR. JOSEPH STOKES JR., Philadelphia: Could Dr. Weech say whether the effect of lactalbumin has been studied by any one?

Dr. A. Ashley Weech, New York: In answer to Dr. Stokes' question I can say only that we intend to study lactalbumin. We have not worked with it yet.

Respiratory Metabolism in Infancy and in Childhood: XX. The Nitrogen Metabolism in Premature Infants—Comparative Studies of Human and Cow's Milk. Dr. Harry H. Gordon (by invitation), Dr. S. Z. Levine, Dr. M. A. Wheatley and E. Marples, New York.

This article will be published in full, with the discussion, in a later issue of the American Journal of Diseases of Children.

Body Content of Certain Minerals During Fetal Life: II. Question of Mineral Storage. Dr. W. W. Swanson and Dr. Vivian Iob (by invitation), Chicago.

We have analyzed to date 116 fetuses for one or more of their mineral constituents. A summary of the published data and of the data from further chemical analyses of parts from 46 additional fetuses is used in determining the mineral content and mineral storage of the fetus.

The values which we have obtained for the calcium and the phosphorus content of the fetus are higher than those obtained by earlier investigators. The values for iron are almost identical with those obtained in similar studies. The calculated daily mineral need of the fetus at the eighth and tenth lunar months are: (1) calcium, 0.17 and 0.33 Gm.; (2) phosphorus, 0.1 and 0.2 Gm., and (3) iron, 2 and 4 mg.

In this chemical investigation evidence of calcium and phosphorus storage was not apparent, since: (1) a critical analysis of the figures obtained for calcium and phosphorus showed that the same values per unit of weight were to be found in like bones during the entire fetal period; (2) also, if the dry weight of the whole bony skeleton is considered, the young fetus and the full term infant have a calcium and a phosphorus content proportionate to their respective skeletal weights, and (3) furthermore, the logarithmic plotting of either the calcium or the phosphorus values against the dry weight of the body gives a straight line, indicating a uniform rate of growth.

The values obtained for iron show that storage does take place during fetal growth. It appears from our data that the concentration of iron occurs in the liver, since per unit weight of dry liver the iron content increased about two and a half times during fetal growth.

Harrison, Darrow and Yannet (*J. Biol. Chem.* **113**:515, 1936) suggested that the sodium content of bone increases with growth and that more sodium is found than can be assumed for extracellular water. The positive difference between total sodium and that in extracellular water was labeled "excess sodium." From our study of fetal bones, this excess of sodium was present to the extent of 160 milliequivalents in bones from the very small fetus and 350 milliequivalents in bones from the full term infant.

PAPERS READ BY TITLE

Observations Regarding Infections of the Right Middle Lobe of the Lung. Dr. Harold L. Higgins, Boston.

Blood Coagulation Factors in Hemorrhagic Diseases of the New-Born and the Value of Intramuscular Injections of Mother's or Father's Blood. Dr. Heyworth N. Sanford, and Dr. Eleanor I. Leslie (by invitation), Chicago.

Observations on Laryngeal Papilloma in Children. Dr. L. Emmett Holt Jr., Baltimore.

Further Observations on the Metabolism of Lactic Acid and Sodium Lactate and the Therapeutic Uses of These Substances. Dr. Alexis F. Hartmann, St. Louis.

CHICAGO PEDIATRIC SOCIETY

Annual Meeting, May 25, 1937

ROBERT A. BLACK, M.D., *President*

JAMES H. WALLACE, M.D., *Secretary*

PEPTIC ULCER IN CHILDREN. DR. A. M. SERBY and DR. LEON BLOCK (by invitation).

A series of 13 cases of duodenal ulcer in children and 5 cases in adults in whom the history extended back to childhood is presented. Until recently duodenal ulcer appeared to be an extreme rarity in children, but since the appearance of our first paper, in 1932, reports of 25 or more additional cases of this condition in children have appeared.

A typical history is that of regularly recurring distress from one to three hours after ingestion of food, relieved by taking food or sodium bicarbonate. One of our patients had hemorrhage; perforation and obstruction occurred in none. Abstracts of the histories in 2 cases are given.

The familial history of 23 per cent of the children approximates our experience with adults. As in adults, there are frequent recurrences and remissions.

Infections of the upper respiratory tract may play a large part in producing recurrences. No data are available on the influence of psychic disturbances such as are considered important in adults. The rôle of allergy is considered entirely speculative.

From 5 adult patients a history of ulcer dating back to the ages of 6 to 18 was obtained. Undoubtedly this number would be larger could a better history be obtained in some cases or if some of the patients had a better memory of early diseases.

As a rule, ambulatory treatment, consisting in frequent feedings of well comminuted bland foods, with administration of belladonna and occasionally calcium carbonate or sodium carbonate, sufficed. It is our custom to give a meat-free diet for about a month and then allow meat if a remission has occurred. After a period of freedom for three months it has been customary to allow a low residue diet, free from spices and irritants.

DISCUSSION

DR. I. HARRISON TUMPEER: I should like to know if the essayists have had any experience with histidine therapy.

DR. A. M. SERBY: No, we have not used histidine. This is quite new so far as therapy is concerned, and most of these patients were studied before that method of treatment came out.

INFECTION OF THE LOWER PART OF THE GENITAL TRACT IN GIRLS. DR. J. L. REICHERT, DR. I. M. EPSTEIN, DR. RUTH JUNG and DR. CHARLOTTE A. COLWELL.

This article will be published in full, with the discussion, in a later issue of the AMERICAN JOURNAL OF DISEASES OF CHILDREN.

TREATMENT OF CONGENITAL SYPHILIS: A SURVEY OF SIX YEARS' WORK AT THE CHILDREN'S SYPHILIS CLINIC, CENTRAL FREE DISPENSARY, CHICAGO. DR. NOEL G. SHAW.

In a preliminary survey of the results in the Children's Syphilis Clinic at the Central Free Dispensary for the past six years, I reviewed the charts of 95 children with congenital syphilis who were still active in attendance. Nine of these had had treatment elsewhere, and their Wassermann reactions were negative on entrance to the clinic and have remained negative on further treatment. Of

the 86 children whose Wassermann reactions were positive on entrance, 9 have not completed a first course. Of the 77 children whose Wassermann reactions were positive and who have completed one or more courses, only 14 have positive reactions at the present time. One child is "Wassermann-fast."

The important factors in successful treatment of congenital syphilis seem to be: regular attendance by the patient, adequate dosage (which does not necessarily mean large doses) and continuous treatment during the first year or until the syphilis is under control enough to allow moderate rests without reversal of the Wassermann reaction, followed by sufficient treatment for two or more years thereafter to effect a "cure" if possible.

The usual method of treatment in this dispensary is a minimum of two courses per year for three years. A course consists of ten weekly injections of arsenic (sulfarsphenamine in infants too small for neoarsphenamine, intravenously) followed by ten weekly injections of potassium bismuth tartrate. Every course is followed by a standard rest period of four weeks and a Wassermann test. No matter whether the Wassermann reaction is positive or negative after the first course, treatment is resumed for another twenty weeks. When the patient's Wassermann reaction has been negative after two succeeding long courses, then for the first time an extra period of two months' rest is allowed. The courses may be shortened in the second and third years if there has been no relapse. Patients with persistently positive reactions are kept under continuous treatment with some variation of drugs and occasional short rests. In this manner it has been possible to obtain and maintain negative Wassermann reactions in these difficult patients with the exception of a child who has juvenile paresis.

The administration of acetarsone by mouth is a valuable addition to the treatment of congenital syphilis but should be used in conjunction with the administration of bismuth to obtain best results. A course of acetarsone consists of 0.015 Gm. per kilogram daily (in divided doses) five days per week for eight weeks. Reactions are nil with this conservative dosage.

Bismarsen is used in the clinic in cases of interstitial keratitis, with excellent results.

Although good results are more difficult to obtain in congenital than in acquired syphilis, the prognosis for a cure in congenital syphilis is quite good. A cure should mean eradication of the spirochete, so that no flare-up of the infection will ever occur. A Wassermann test should be done every six months after a child is considered cured.

DISCUSSION

DR. LLOYD ARNOLD: I am interested in public health, and I do not feel competent to discuss treatment. I am, however, much concerned with the distribution of syphilis in the population. Case finding methods and sound diagnostic laboratory procedures are of the greatest concern.

One thing I wish to mention is the diagnostic methods employed in the Chicago board of health laboratories and the state department of public health in connection with syphilis. They employ these methods for different purposes. My colleagues and I have an enormous amount of correspondence because the Chicago department of health is running a Wassermann test for syphilis for medicolegal purposes. The state health department runs a very sensitive test for syphilis for diagnosis. That illustrates the standardization of the diagnosis of syphilis by health authorities. One department may be using a test for medicolegal purposes and one may be using it for case findings for physicians, but both are doing the best they can under the circumstances. I believe the state and county medical societies could work very well together with the local departments of health if they could just understand what they are talking about and agree on what is the best procedure.

DR. NOEL G. SHAW: The only thing I might say is that I think the outlook for cure in congenital syphilis is quite good. I did not feel that way when I first started the work, but if one keeps after these patients long enough I think one can cure most of them.

Book Reviews

The Diseases of Infants and Children. By Dr. J. P. Crozer Griffith and Dr. A. Graeme Mitchell. Cloth. Price, $10. Pp. 1,153, with 293 illustrations. Philadelphia: W. B. Saunders Company, 1937.

An excellent textbook and reference book has been provided by Drs. Griffith and Mitchell in the second edition of "The Diseases of Infants and Children." A full bibliography at the end of each chapter facilitates the finding of material which will give a fuller treatment of the subject than can be presented in one volume.

The text itself is clear and concise but not didactic. The illustrations are good, definitely adding to the value of the work. The chapters on endocrine disturbance and therapy show a clear insight into this field and probably as a consequence are characterized by greater conservatism than many other works on the subject. The book is highly recommended.

Reading, Writing and Speech Problems in Children. By Dr. Samuel Torrey Orton. Price, $2. Pp. 218, with 24 illustrations. New York: W. W. Norton & Company, Inc., 1937.

In this volume the author summarizes his findings during a ten year period of intensive study of the disorders associated with the acquisition of language.

The first part of the volume describes the disorders which follow the destruction of small areas of the brain, emphasizing the relation of the disorders to the "sidedness" of the brain. Chapter 2 describes the types of disorder in development found in children. Developmental alexia (reading disability), agraphia (spelling disability), word deafness, motor asphasia (motor speech delay), apraxia (abnormal clumsiness) and stuttering are described in detail. Chapter 3 takes up the neurologic interpretation of the disorders and the methods of treatment.

The material presented is a valuable contribution to the study of children. Clearly written from a scientific point of view by an outstanding authority, it should be a valuable aid to every one working with school children.

Diseases of the Newborn. By Abraham Tow. No price given. Pp. 477, with 53 illustrations. New York: Oxford University Press, 1937.

This is a complete textbook on the new-born. The chapters are on anatomy and physiology, feeding, prematurity, injuries sustained at birth, the skeletal system, the digestive system, the respiratory system, the circulatory system, dyscrasias of the blood, the genito-urinary system, the nervous system, the eye, ear and nose, infectious diseases and diseases of the skin. The final chapter, on special topics, contains a discussion of disease of the thyroid gland, mongolian idiocy, vitamin deficiency and the offspring of diabetic mothers. All these topics are discussed in a comprehensive and intelligent manner. Illustrations are used when necessary and on the whole are well chosen. At the end of each chapter is a complete bibliography. The author has organized his material well and presents it in a readable fashion. He has been fair in his presentations of debatable procedures. Such procedures are described, and the reader can choose for himself.

All in all, this is an excellent textbook. The field is fully covered, and the author's style is readable. The printing and the binding are up to the usual Oxford standard. This book should make a valuable reference book in every pediatric library.

Dietetics for the Clinician. By Dr. Milton Arlanden Bridges. Third edition. Price, $10. Pp. 1,055, with 85 tables. Philadelphia: Lea & Febiber, 1937.

Dr. Bridges has compiled an exceedingly valuable work on dietetics not only from the standpoint of a reference book but from that of a stimulating exposition of the science of nutrition.

The chapters on the mechanics, physiology and chemistry of digestion and those on the vitamins show a wealth of up-to-date knowledge and a keen insight into the significance of many isolated discoveries. For reference, chapters on the classification and structure of foods and the distribution of the various substances and vitamins in foods are available.

In part II, the various diseases of adults and diets suitable for each are presented in alphabetical order. Part III is devoted entirely to the feeding of infants and the dietetic management of diseases in children. The appendix is unusually complete.

Children in the Family. By Harold D. Anderson, Ph.D. Price, $2.00. Pp. 245. New York: D. Appleton-Century Company, Inc., 1937.

The basic concept of this book, that of respect for the child and of his right to make mistakes without undue condemnation, is sound. The author has valiantly striven to produce the sort of attitude which will permit the child to grow into a responsible place in the family.

By means of many anecdotes, which are well told and pat, he illustrates his points in an interesting and readable manner. Dr. Anderson writes convincingly about the subjects on which he has so long and successfully labored.

The last few chapters on clothing, nutrition, physical growth and health are not tied up with his dominant theme, and one feels that the book would have been more purposeful and concrete if they had been left out.

As a whole, the work is a distinctly constructive addition to the growing literature for parents.

Juvenile Paresis. By Dr. William C. Menninger. Price, $3. Pp. 199, with 16 illustrations. Baltimore: Williams & Wilkins Company, 1936.

This well written monograph is an excellent presentation of the whole picture of juvenile dementia paralytica. The twelve chapters have been published separately in various medical journals. The study is based on 43 cases personally observed and 610 cases recorded in the literature. The author included only the cases from the literature which included proper and sufficient data to substantiate the diagnosis. There is a summary at the end of each chapter. The one previous monograph on this subject, by Toni Schmidt-Kroepelin, was limited to a discussion of 40 cases of her own and did not include a discussion of psychology, treatment or pathology.

The monograph is a real contribution to the subject of juvenile dementia paralytica and should prove especially valuable to any person concerned with the management of patients with this condition.

The Prophylaxis and Treatment of Rheumatic Disease Through Photofixation of Pathogenic Antigens. Photoimmunization and Photovaccination. The Theoretical Possibility of Immunizing the Olfactory Mucosa Against Poliomyelitis Virus. By S. Peskind, M.D. No price given. Pp. 12, 13 and 22, respectively, with no illustrations. Cleveland: S. P. Mount Printing Co., 1936.

These three pamphlets embody absolute theory without the quotation of any basic facts on which the ideas may rest. That ultraviolet radiation from a quartz lamp liberates antigens from a deep focus of infection is a characteristic theory expressed. Nothing further need be said.

Aids to Diagnosis and Treatment of Diseases of Children. By F. M. B. Allen. Price, $1.50. Pp., 328. London: Baillere, Tindall & Cox, 1937.

This book is the seventh volume of the aids to students published by Baillere, Tindall and Cox (American publishers, Williams and Wilkins Company, Baltimore). It covers the entire field of pediatrics in a simple and concise manner. The appendix contains a description of pediatric procedures and the incubation periods of contagious diseases and the more frequently used prescriptions. The book should be of value to students and to general practitioners who wish to learn about the commoner conditions of children in the shortest possible time.

Directory of Pediatric Societies *

INTERNATIONAL

International Association of Preventive Pediatrics

President: Professor G. Scheltema, 6a Herreplein, Groningen, Netherlands.
Secretary: Dr. Daniel Oltramare, 15 Rue Lévrier, Geneva, Switzerland.

International Congress of Pediatrics

President: Prof. Luigi Spolverini, Policlinico Lungo Tevere Melini 24, Rome, Italy.
Secretary: Professor Vitetti, Rome, Italy.
Place: Rome, Italy. Time: Sept. 27-30, 1937.
American Committee:
Chairman: Dr. Henry F. Helmholz, Mayo Clinic, Rochester, Minn.
Secretary: Dr. L. Emmett Holt Jr., Johns Hopkins Hospital, Baltimore.
Canadian Committee:
Chairman: Dr. H. B. Cushing, 1390 Sherbrooke St., W., Montreal.
Secretary: Dr. H. P. Wright, 1509 Sherbrooke St., W., Montreal.

International Congress for the Protection of Infancy

Secretary: Prof. G. B. Allaria, Corso Bramante 29, Torino 120, Italy.
Place: Rome, Italy. Time: Oct. 4-8, 1937.

FOREIGN

British Paediatric Association

President: Dr. J. Wilkie Scott, 40 The Rope Walk, Nottingham, England.
Secretary: Dr. Arthur G. Maitland Jones, 31A Weymouth St., London, W. 1.

Paediatrický Spolok na Slovensku

President: Dr. A. J. Chura, Lazaretská 6, Bratislava, Czechoslovakia.
Secretary: Dr. S. Limbacher, Dlhá 2, Bratislava, Czechoslovakia.
Place: Pediatric Clinic, University, Bratislava. Time: Six times a year.

Royal Society of Medicine, Section for the Study of Disease in Children

President: Sir Lancelot Barrington-Ward, 85 Harley St., London, W. 1.
Secretary: Dr. K. H. Tallerman, 122 Harley St., London, W. 1.
Place: 1 Wimpole St., London. Time: Fourth Friday of each month, 4:30 p. m.

Palestine Jewish Medical Association, Section of Physicians of Children's Diseases

President: Prof. S. Rosenbaum, 26 Bialikstr., Tel Aviv, Palestine.
Secretary: Dr. A. Brünn, 9 Maazestre, Tel Aviv, Palestine.

Sociedad Cubana de Pediatría

President: Prof. Félix Hurtado Galtés, Carlos III 7, Havana.
Secretary: Dr. Carlos Hernández Miyares, San Lazaro 370, Havana.
Place: Cátedra de Clínica Infantil, Hospital Mercedes, Havana. Time: Third Thursday of every month.

*Secretaries of societies are requested to furnish the information necessary to make this list complete and to keep it up to date.

NATIONAL

American Medical Association, Scientific Assembly, Section on Diseases of Children

Chairman: Dr. Clifford D. Sweet, 2940 Summit St., Oakland, Calif.
Secretary: Dr. Albert D. Kaiser, 16 N. Goodman St., Rochester, N. Y.
Place: San Francisco. Time: June 13-17, 1938.

American Academy of Pediatrics

President: Dr. Philip Van Ingen, 125 E. 71st St., New York.
Secretary: Dr. C. G. Grulee, 636 Church St., Evanston, Ill.
Region I. Place: Boston, Mass. Time: Nov. 12-13, 1937.
Region II. Place: New Orleans, La. Time: Nov. 30-Dec. 1-3, 1937.
Region III. Place: Lake Shore Athletic Club, Chicago. Time: Oct. 14-16, 1937.
Region IV. Place: Los Angeles, Calif. Time: Nov. 4-6, 1937.

American Hospital Association, Children's Hospital Section

Chairman: Dr. Howard Childs Carpenter, 1805 Spruce St., Philadelphia.
Secretary: Miss Edith F. Bateman, Shriners' Hospital for Crippled Children, St. Louis, Mo.

American Pediatric Society

President: Dr. Kenneth D. Blackfan, 300 Longwood Ave., Boston.
Secretary-Treasurer: Dr. Hugh McCulloch, 325 N. Euclid St., St. Louis.
Place: The Sagamore, Bolton Landing, New York. Time: June 9-11, 1938.

Canadian Society for the Study of Diseases of Children

President: Dr. Alton Goldbloom, 1543 Crescent St., Montreal, Quebec.
Secretary-Treasurer: Dr. Pearl Summerfeldt, Hospital for Sick Children, Toronto, Ont.

Society for Pediatric Research

President: Dr. Samuel Z. Levine, 525 E. 68th St., New York.
Secretary: Dr. A. A. Weech, 3975 Broadway, New York.

SECTIONAL

North Pacific Pediatric Society

President: Dr. D. M. Dayton, Medical Arts Bldg., Tacoma, Wash.
Secretary: Dr. H. T. Clay, Medical Arts Bldg., Tacoma, Wash.
Place: Portland, Ore. Time: June 1937.

Southern Medical Association, Section of Pediatrics

Chairman: Dr. Gilbert Levy, 20 S. Dunlap St., Memphis, Tenn.
Secretary: Dr. Hughes Kennedy Jr., Highland Plaza Apts., Birmingham, Ala.

STATE

Alabama Pediatric Society

President: Dr. Wallace A. Clyde, Employees' Hospital, Fairfield.
Secretary-Treasurer: Dr. M. G. Neely, Employees' Hospital, Fairfield.

Arkansas State Pediatric Association

Chairman: Dr. A. C. Kirby, 701 Main St., Little Rock.
Secretary: Dr. Madeline M. Melson, 909 Main St., Little Rock.

California State Medical Society, Section on Pediatrics

Chairman: Dr. E. Earl Moody, 3780 Wilshire Blvd., Los Angeles.
Secretary: Dr. Hartzel H. Ray, 23—2nd Ave., San Mateo.

Florida State Pediatric Society

President: Dr. Douglas D. Martin, 442 W. Lafayette St., Tampa.
Secretary: Dr. Warren W. Quillian, 227 Avenue Aragon, Miami.
Place: Concurrent with state association meeting at time of convention.

Georgia Pediatric Society

President: Dr. Roger W. Dickson, 33 Ponce de Leon Ave., N. E., Atlanta.
Secretary-Treasurer: Dr. Don F. Cathcart, 478 Peachtree St., N. E., Atlanta.

Hezekiah Beardsley Pediatric Club of Connecticut

President: Dr. Howard W. Brayton, 179 Allyn St., Hartford.
Secretary: Dr. Joseph L. Hetzel, 103 N. Main St., Waterbury.

Indiana State Pediatric Society

President: Dr. Ernest R. Carlo, 2902 Fairfield Ave., Fort Wayne.
Secretary-Treasurer: Dr. Mathew Winters, 23 E. Ohio St., Indianapolis.
Time: Two meetings a year.

Louisiana State Pediatric Society

President: Dr. Clarence H. Webb, 624 Travis St., Shreveport.
Secretary-Treasurer: Dr. Ruth Aleman, 1407 S. Carrollton Ave., New Orleans.

Medical Society of State of New York, Section on Pediatrics

Chairman: Dr. George M. Retan, 459 James St., Syracuse.
Secretary: Dr. John D. Craig, 33 E. 61st St., New York.

Michigan State Medical Society, Pediatric Section

Chairman: Dr. Edgar E. Martmer, 749 David Whitney Bldg., Detroit.
Secretary: Dr. C. R. Dengler, 131 W. Michigan Ave., Jackson.

Mississippi State Pediatric Society

President: Dr. Guy C. Jarratt, 920 Cawford St., Vicksburg.
Secretary-Treasurer: Dr. Harvey F. Garrison Jr., 315 E. Capitol Pl., Jackson.
Place: To be designated by Society. Time: Yearly.

Nebraska Pediatric Society

President: Dr. J. A. Henske, 1614 Medical Arts Bldg., Omaha.
Secretary-Treasurer: Dr. J. H. Murphy, 915 Medical Arts Bldg., Omaha.
Place: As announced by committee. Time: Third Thursday of each month from October to June, inclusive. Dinner at 6 p. m.

North Carolina Pediatric Society

President: Dr. John LaBruce Ward, Arcade Bldg., Asheville.
Secretary: Dr. Lewis Elias, 36 Grove St., Asheville.

Oklahoma State Pediatric Society

President: Dr. B. H. Nicholson, 301 N. W. Twelfth St., Oklahoma City.
Secretary: Dr. Hugh C. Graham, 1501 S. Baltimore Ave., Tulsa.

Pennsylvania Medical Society, Pediatric Section

Chairman: Dr. Theodore O. Elterich, 3700 Fifth Ave., Pittsburgh.
Secretary: Dr. John M. Higgins, Sayre.

South Carolina Pediatric Society

President: Dr. Leland B. Salters, 317 S. Warley St., Florence.
Secretary-Treasurer: Dr. D. Lesesne Smith Jr., 187 Oakland Ave., Spartanburg.

TENNESSEE STATE PEDIATRIC SOCIETY

President: Dr. Joe T. Smith, 702 Medical Arts Bldg., Knoxville.
Secretary: Dr. Kinsey M. Buck, 1193 Madison Ave., Memphis.

TEXAS PEDIATRIC SOCIETY

President: Dr. John G. Young, 3930 McKinney Ave., Dallas.
Secretary-Treasurer: Dr. F. H. Lancaster, 4409 Fannin St., Houston.
Place: Dallas. Time: Fall.

VIRGINIA PEDIATRIC SOCIETY

President: Dr. Basil B. Jones, 1028 W. Franklin St., Richmond.
Secretary: Dr. W. A. McGee, 616 W. Grace St., Richmond.

WEST VIRGINIA STATE MEDICAL SOCIETY, SECTION ON PEDIATRICS

President: Dr. John T. Thornton, 58—16th St., Wheeling.
Secretary: Dr. Claude L. Holland, 400 Locust Ave., Fairmont.

LOCAL

ACADEMY OF MEDICINE OF CLEVELAND, PEDIATRIC SECTION

Chairman: Dr. J. D. Pilcher, City Hosital, Cleveland.
Secretary: Dr. William M. Champion, 2323 Prospect Ave., Cleveland.
Place: Cleveland Medical Library Bldg. Time: October, December, February and April.

ACADEMY OF MEDICINE, TORONTO, SECTION OF PEDIATRICS

President: Dr. T. B. Verner, 170 St. George St., Toronto.
Secretary: Dr. D. V. Hutton, 170 St. George St., Toronto.

BRONX PEDIATRIC SOCIETY

President: Dr. Daniel J. Doan, 420 E. 159th St., New York.
Secretary: Dr. Samuel T. Levethan, 254 E. 184th St., New York.
Place: Concourse Plaza Hotel, 161st St. and Grand Concourse. Time: Every second Wednesday of each month, except June, July, August and September.

BROOKLYN ACADEMY OF PEDIATRICS

President: Dr. Walter D. Ludlum, 1421 Cortelyou Rd., Brooklyn.
Secretary: Dr. John A. Monfort, 861 Carroll St., Brooklyn.
Place: Kings County Medical Society Bldg. Time: Fourth Wednesday of each month, except May, June, July, August and September.

CENTRAL NEW YORK PEDIATRIC CLUB

President: Dr. Frank Vasder Bogert, 111 Union St., Schenectady.
Secretary: Dr. Frank J. Williams, 58 S. Swan St., Albany.
Place: Various cities in New York. Time: Third Thursday of April and September.

CHICAGO PEDIATRIC SOCIETY

President: Dr. C. A. Aldrich, 723 Elm St., Winnetka, Ill.
Secretary: Dr. George F. Munns, 723 Elm St., Winnetka, Ill.
Place: Children's Memorial Hospital, 710 Fullerton Ave., Chicago. Time: Third Tuesday of each month, October to May, inclusive.

DALLAS PEDIATRIC SOCIETY

President: Dr. John Young, 3930 McKinney Ave., Dallas, Texas.
Secretary-Treasurer: Dr. John E. Ashby, 3622 Fairmont Ave., Dallas, Texas.
Place: Bradford Baby Hospital. Time: 1 p. m., second and fourth Saturdays of each month.

Detroit Pediatric Society

President: Dr. Edward A. Wishropp, 10 Peterboro St., Detroit.
Secretary: Dr. W. J. Scott, 5140—2nd Ave., Detroit.
Place: Wayne County Medical Society. Time: 8:30 p. m., first Wednesday of each month from October to June, inclusive.

Fulton County Medical Society, Pediatric Section (Atlanta, Ga.)

Chairman: Dr. T. F. Davenport, 104 Ponce de Leon Ave., Atlanta.
Secretary: Dr. James P. Hanner, 384 Peachtree St., Atlanta.
Place: Academy of Medicine, 38 Prescott St., N. E. Time: Second Thursday of each month from October to April, 8 p. m.

Houston Pediatric Society

President: Dr. Walter F. Qualtrough, 920 Westheimer Ave., Houston, Texas.
Secretary-Treasurer: Dr. Allan Bloxsom, 4402 Travis St., Houston, Texas.
Place: Houston Club. Time: Third Monday of each month.

Intermountain Pediatric Society

President: Dr. Eugene Smith, 385—24th St., Ogden, Utah.
Secretary-Treasurer: Dr. W. C. Cheney, 837 Boston Bldg., Salt Lake City, Utah.
Place: Salt Lake City, General Hospital. Time: First Thursday of each month, 8 p. m.

Kansas City (Missouri) Pediatric Society

President: Dr. W. R. Moore, 620 Francis St., St. Joseph.
Secretary: Dr. F. S. Hogue, 1103 Grand Ave., Kansas City.
Place: Kansas City General Hospital. Time: On call.

Los Angeles County Medical Association, Pediatric Section

President: Dr. Edwin F. Patton, 3875 Wilshire Blvd., Los Angeles.
Secretary-Treasurer: Dr. Henry F. Gallagher, 1930 Wilshire Blvd., Los Angeles.
Place: Los Angeles County Medical Headquarters, 1925 Wilshire Blvd.
Time: Second Monday of February, April, June, October and December.

Medical Society of the County of Kings and the Academy of Medicine of Brooklyn, Pediatric Section

President: Dr. Harry R. Litchfield, 163 Eastern Parkway, Brooklyn.
Secretary: Dr. Jacob Rosenblum, 550 Ocean Ave., Brooklyn.
Place: 1313 Bedford Ave., Brooklyn. Time: Third Wednesday of each month, October to May.

Medical Society of the County of Queens, Inc., Section on Pediatrics

Chairman: Dr. W. C. A. Steffen, 42 Union St., Flushing, N. Y.
Secretary-Treasurer: Dr. Edith A. Mittell, 144—38th Ave., Flushing, N. Y.
Place: Queens County Medical Bldg., Forest Hills, N. Y. Time: Third Monday of October, January, March and May.

Memphis Pediatric Society

President: Dr. Clyde V. Croswell, 1052 Madison Ave., Memphis, Tenn.
Secretary-Treasurer: Dr. David W. Goltman, 1073 Madison Ave., Memphis, Tenn
Place: John Gaston Hospital. Time: Quarterly.

Milwaukee Pediatric Society

President: Dr. George F. Kelly, 425 E. Wisconsin St., Milwaukee.
Secretary: Dr. Helen Jane Zilmer, 781 N. Jefferson St., Milwaukee.
Place: Children's Hospital. Time: Second Wednesday of each alternate month, beginning with February.

New England Pediatric Society

President: Dr. Henry E. Utter, 122 Waterman St., Providence, R. I.
Secretary-Treasurer: Dr. Henry E. Gallup, 1101 Beacon St., Brookline, Mass.
Place: Boston Medical Library. Time: Four meeting a year, occurring from September to May.

New York Academy of Medicine, Section of Pediatrics

Chairman: Dr. Alexander T. Martin, 107 E. 85th St., New York.
Secretary: Dr. Philip M. Stimson, 25 Claremont Ave., New York.
Place: New York Academy of Medicine, 2 E. 103d St. Time: Second Thursday of each month from October to May, inclusive, 8:30 p. m.

Northwestern Pediatric Society

President: Dr. A. V. Stoesser, University Hospital, Minneapolis.
Secretary: Dr. Roger L. J. Kennedy, Mayo Clinic, Rochester, Minn.
Place: Minneapolis, St. Paul, Duluth and Rochester. Time: January, April, July and October.

Oklahoma City Pediatric Society

President: Dr. A. L. Salomon, 1200 N. Walker St., Oklahoma City.
Secretary: Dr. G. R. Felts, 1200 N. Walker St., Oklahoma City.
Time: Alternate months.

Philadelphia Pediatric Society

President: Dr. Emily Bacon, 2104 Spruce St., Philadelphia.
Secretary: Dr. James E. Bowman, 4091 Comly St., Philadelphia.
Place: College of Physicians, 19 S. 22d St. Time: Second Tuesday of each month from October to June, inclusive.

Pittsburgh Pediatric Society

President: Dr. James LeRoy Foster, Highland Bldg., Pittsburgh.
Secretary-Treasurer: Dr. E. R. McClusky, 3200—5th Ave., Pittsburgh.
Place: Pittsburgh Academy of Medicine. Time: Second Friday, alternate months from October to April, inclusive.

Richmond Pediatric Society

President: Dr. Lee E. Sutton Jr., 2601 Grove Ave., Richmond, Va.
Secretary-Treasurer: Dr. Louise Fry Galvin, 2416 Stuart Ave., Richmond, Va.
Place: Richmond Academy of Medicine, 1200 E. Clay St. Time: First Thursday of each month (except July, August and September).

Rochester Pediatric Society

President: Dr. F. W. Bush, 29 N. Goodman St., Rochester, N. Y.
Secretary: Dr. David Wolin, 16 N. Goodman St., Rochester, N. Y.
Place: Arranged by program committee. Time: Second Friday of each month.

Rocky Mountain Pediatric Society

President: Dr. James E. Russell Jr., 820 Metropolitan Bldg., Denver.
Secretary: Dr. F. Craig Johnson, 1850 Gilpin St., Denver.
Place: Children's Hospital, Denver. Time: First Saturday of each month from September to May, inclusive, 2:30 p. m.

St. Louis Pediatric Society

President: Dr. John Zahorsky, 536 N. Taylor Ave., St. Louis.
Secretary-Treasurer: Dr. Max Deutch, 634 N. Grand Blvd., St. Louis.
Place: St. Louis Medical Society. Time: Third Friday of every month.

Seattle Pediatric Society

President: Dr. Frank H. Douglass, Medical Dental Bldg., Seattle.
Secretary: Dr. C. Lu Verne Smith, Stimson Bldg., Seattle.
Place: College Club. Time: Third Friday of each month, 6:30 p. m.

Southwestern Pediatric Society

President: Dr. Louis M. Earle, 6381 Hollywood Blvd., Los Angeles.
Secretary: Dr. Philip E. Rothman, 3875 Wilshire Blvd., Los Angeles.
Place: University Club of Los Angeles. Time: First Wednesday in January, March, May, September and November.

University of Michigan Pediatric and Infectious Disease Society

President: Dr. M. Cooperstock, Northern Michigan Children's Clinic, Marquette.
Secretary: Dr. D. Murray Cowie, University of Michigan, Ann Arbor, Mich.

Westchester County Medical Society, Pediatric Section (New York)

President: Dr. Louis V. Waldron, 149 N. Broadway, Yonkers, N. Y.
Secretary-Treasurer: Dr. Fairfax Hall, 421 Huguenot St., New Rochelle, N. Y.
Place: Grasslands Hospital. Time: Third Thursday, October, December, February and April.